STATE OF CALIFORNIA
DEPARTMENT OF INDUSTRIAL RELATIONS
Division of Occupational Safety and Health
No. CA Process Safety Management
1450 Enea Circle, Suite 550
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cfritz@dir.ca.gov

Arnold Schwarzenegger, Governor

07/22/08

DOCUMENT REQUEST

TO: **Mark Robinson, Safety Team Lead**
Chevron Products Co.

FROM: Carla Fritz
Cal OSHA Compliance Engineer

SUBJ: **Complaint of Unsafe Working Conditions –**
Tetraethyl Lead Work Practices – Blending & Shipping

This office has been informed of allegedly unsafe working conditions taking place at the refined side of the Blending & Shipping unit. Said conditions have been created during railcar offloading & subsequent blending of tetraethyl lead.

Pursuant to my investigation into the above referenced complaint, please provide copies of the documents listed on my document request by **08/04/08.** Please be advised that I may request additional documents.

Thank you in advance for your cooperation in this investigation.

Carla Fritz
(925) 602-5779
(925) 602-2668 (fax)

Ref: 311070239

STATE OF CALIFORNIA *Arnold Schwarzenegger, Governor*

DEPARTMENT OF INDUSTRIAL RELATIONS
Division of Occupational Safety and Health
No. CA Process Safety Management
1450 Enea Circle, Ste. 550
Concord, CA 94520
Ph: (925) 602-2665
Fax: (925) 602-2668

Document Request

Pursuant to my inspection as a Cal/OSHA Compliance Engineer, please provide copies of the following documents by the "postmarked date" below. Please be advised that failure to provide the documents could be interpreted as an admission that the documents do not exist, which could result in citations and monetary penalties. Please be advised that additional document requests may follow:

PLEASE POSTMARK RESPONSE BY: 08/04/08

All requests pertain only to the tetraethyl lead (TEL) railcar offloading & Av-Gas blending operations at the refined side of Blending & Shipping

1) Written Operating Procedures for both offloading & blending, including:
   - Normal, temporary, emergency
   - Consequences of deviation & steps to correct/avoid deviation
   - Description of all PPE required

2) Process Safety Information, including:
   - Hazard information for materials used in the process, including all MSDS
   - Overview of process, including frequency & quantities involved
   - Information pertaining to the equipment in the process, including specifications for loading arm assembly, loading hoses, blending manifold

3) Process Hazard Analysis for TEL railcar offloading & blending operations
4) Management of Change documentation for temporary operating procedure(s)
5) Any & all monitoring data compiled pursuant to these operations
6) Inspection reports for TEL storage vessel removed from service due to deterioration, including records of welded repairs
7) Fit test records for all employees conducting these activities
8) Documented training for all employees conducting these activities

Carla Fritz
cfritz@dir.ca.gov
(925) 602-2665
(925) 602-2668 (fax)

Received by:_____ Title:_____

Do it safely or not at all

Approval: Daryl Singleton	Date: 10/4/07

Purpose:

This checklist provides instructions for offload, de-pressure, and release a TEL B Aviation Mix Lead Car and adding Tetra Ethyl Lead (TEL), to an Aviation Gasoline mix. TEL stands for Tetra Ethyl Lead, the main component in this anti-knock mixture. TEL will be batch blended into T-3214, offload rail car completely.

Safety Precautions:

Standard Personal Protective Equipment required at all times.

When Educting material in the Lead Plant wear disposable earplugs and/or ear muffs.

Safety precaution when offloading TEL Tank Car:

- Leather gloves and shoes offer little to no protection against TEL.
- Chemical Goggles, for severe exposure add face shield.
- Poly coated Tyvex coveralls.
- Neoprene or PolyVinyl Chloride (PVC) gloves
- Rubber boots
- Hearing protection: disposable earplugs and/or earmuffs.
- TEL Aviation Mix is a mixture of Tetraethyl Lead, Kerosene, and about one-third 1,2 Dibromoethane (EDB), which is a known carcinogen.
- Respirator with organic vapor cartridge
  If exposure over the Permissible Exposure Limit (PEL) of 0.075 mg/m3 for TEL is expected, then supplied air is required. For EDB, Ethyl Corporation recommends a PEL of 0.1 ppm and OSHA sets a 30 ppm Ceiling. All these PELs are based on 8 hour shifts.
- 5 gallon bucket of Kerosene (Pearl Oil) available for rinsing tools.

Establish at least 10 inches of vacuum before connecting or disconnecting loading arm.

Environmental Precautions:

Use a suitable sample container when testing valves for integrity.

Replace valve bleeder caps to comply with environmental regulations.

5 gallon bucket of Kerosene (Pearl Oil) available for absorbing accidental drips. Because TEL is toxic, drip leaks must be stopped right away.

1a

References:

- Job Aid # TBR2Q32J:
  "Ethylizing an Aviation Fuel Mix (Adding Antioxidant, Dye, and TEL)".
- Training Film: "Lead Car Unloading".
- Training Film: "Safe Handling of Ethyl Anti-knock Compounds; Loading Anti-knock Bulk Containers; Unloading & Blending Anti-Knock Compounds".
- Ethyl Corporation Booklet: "Major Emergency Procedures" (Rev. Sept. 2006).
- MSDS #2647; Aviation Gasoline. Located in the MSDS Database.
- MSDS: # DV011762 TELB (TEL B Aviation Fuel Antiknock Additive), Ethyl Corporation. Located in MSDS Database.
- Synonyms: "TEL Aviation Mix"
  "Ethyl Antiknock Compound"
  "TEL"
  "Lead"
- MSDS: Kerosene (Pearl Oil)
- Primary Checklist, TBRN5075.

Prerequisites:

- T-3214 has been blended and sampled for B-4 specifications.
- Paperwork required: Aviation Ethylization Report, Lead Book.
- Required amounts of TEL are available.
- Lead Car spotted car on #10 spot.
- Tools: 11/16" Box End Wrench, Pipe wrench, Combination vacuum / pressure gauge with vent, metal pick (for gasket removal).
- Properly labeled Hazardous Waste drum on site for all TEL contaminated items.
- Operators working in Ethyl Plant have viewed Training films and read Ethyl Corporation Booklet: "Major Emergency Procedures" (Rev. Sept. 2006).

****Detailed Checklist Starts Below****

	Action	Initial
MTF	1. Review Aviation Ethylization Report with Head Operator.	___ ___ ___
RHO	2. Sign and approve Aviation Ethylization Report.	___ ___ ___
MTF	3. Verify railcar is labeled with the prefix ECDX.	___ ___ ___
	NOTE: Ethyl Corporation will permanently assign two railcars with the prefix ECDX exclusively for Richmond deliveries. They have a new fleet scheduled for delivery early in 2008. When these railcar numbers are known they will be updated in this procedure.	
MTF	4. Ensure railcar is spotted correctly.	___ ___ ___

WARNING

TEL tank cars contain a mixture of toxic substances with both immediate and delayed health effects. Lead is a cumulative poison. A large leak of TEL is an emergency. Exposure is immediately dangerous to life and health. (IDLH)

MTF	5. Inspect railcar for leaks or damage.	___ ___ ___
	6. If railcar is ok, isolate 50 track from switch engine.	___ ___ ___

WARNING

Failure to ground railcar before off loading results in static generation & build up. Failure to ground can lead to explosion and fire.

MTF	7. Secure railcar for off loading operations and attach bonding cable	___ ___ ___
RHO	8. Visually inspect and release 50 track and railcar for offloading.	___ ___ ___
SPH	9. Ensure T-3214 is set to circulate via T-3214 fill and the 1 lead.	___ ___ ___
MTF	10. Ensure Ethyl Plant Loop is set for circulation 1 Circ to 1 Lead.	___ ___ ___
	11. Ensure valves: #9, #10 #14, #19, and #33 are opened, locked and tagged.	___ ___ ___

NOTE: To view a diagram of the referenced valve numbers refer to page 7 of this Procedure.

WARNING

Failure to use hearing protection when P-1 is discharging through Lead Skid eductor results in hearing loss which is cumulative over time. Refer to Safety Precautions on Page 1.

MTF 12. Establish T-3214 circulation on the 1 circ through Lead Skid Eductor. ___ ___ ___

13. Confirm G-1 is three times more then G-2. ___ ___ ___

NOTE: Normal operating pressure for G-1 is 360-400 PSIG. PSIG over 400 on G-1 is an indication of plugging in the eductor inlet. Normal operating pressure on G-2 is 85-100 PSIG.

MTF 14. Ensure at least 10" hg on G3. ___ ___ ___

WARNING

Lead is easily absorbed into the body through contact with the skin. Skin contact with organic lead can progress to toxic psychosis with delirium, convulsions, or even coma and is immediately dangerous to life and health. (IDLH)

MTF 15. Gather and inspect PPE. ___ ___ ___

16. Inspect ramp for safe operation. ___ ___ ___

NOTE: TEL Aviation Mix has a blue color and pungent odor even in tiny amounts.

WARNING

If TEL Mixture leaks in excess of the Permissible Exposure Limit (PEL), air-purifying respirators give EGRESS PROTECTION ONLY. Leaks in excess of the PEL will quickly saturate organic vapor cartridges and workers will inhale toxic lead. Only Fresh Air, such as SCBA, can protect people at this level of exposure.

MTF 17. Inspect interior of dome to confirm that car can be offloaded. ___ ___ ___

MTF 18. Install Combination gauge. ___ ___ ___

19. Verify car has at least 3" of vacuum. ___ ___ ___

20. If there is positive pressure in the rail car the car must be returned to Ethyl Corp. ___ ___ ___

WARNING

Removing cover plate with positive pressure in the car may contaminate people and the environment with TEL.

MTF 21. Connect off loading arm to car. ___ ___ ___

WARNING

Opening flange cover toward your body may expose you to TEL spray which is immediately dangerous to life and health. (IDLH)

Open flanges away from your body position.

22. Check off loading arm for leaks. ___ ___ ___

23. If a momentary loss of vacuum is observed, there is a leak in the section of piping between valve # 2a and valve #7. Confirm repairs are complete or if no leak is indicated, the system is ready for offloading. ___ ___ ___

25. Establish flow from car to Lead Skid. ___ ___ ___

NOTE: Vacuum on G-3 will drop to 8-10 Hg when flow has been established. Pulling lead via Valve #2a and the barometric loop prevents lead from entering system without being metered. The Barometric loop will also break the siphon as lead will approach the top of the loop but not go over.

MTF 26. Vent railcar. ___ ___ ___

NOTE: As the lead level in the rail car drops it will begin to vortex and suck in air as this happens the 3" off loading hose will begin to jump. This is an indication that the railcar is nearly empty.

MTF	27. Secure from offloading.	___ ___ ___
	28. Gas wash Lead skid.	___ ___ ___
MTF	29. Disconnect offloading arm.	___ ___ ___

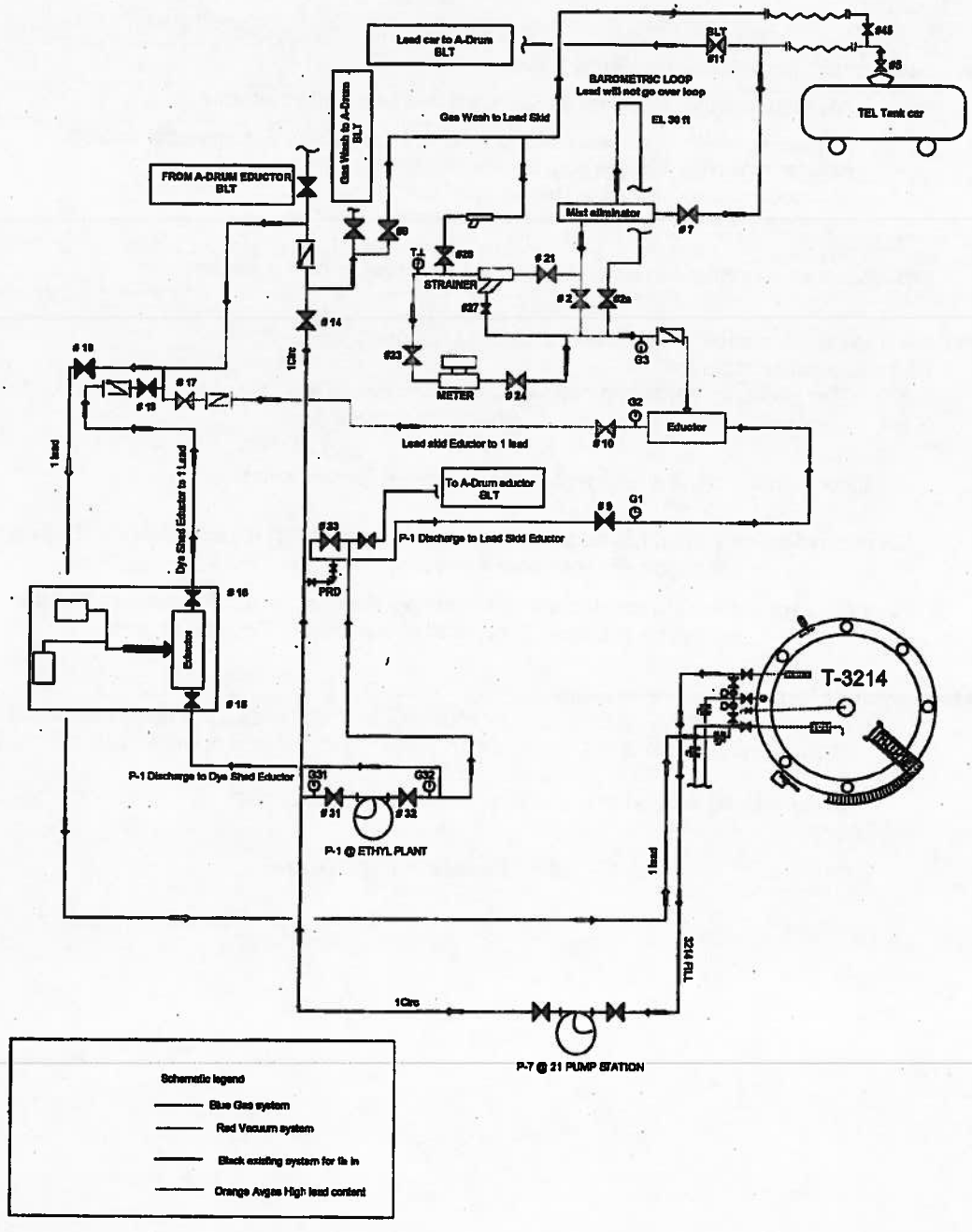
WARNING

Opening flange cover toward your body exposes you TEL spray and is immediately dangerous to life and health. (IDLH)

MTF	30. Open flanges away from your body position.	___ ___ ___
	31. Secure from off loading operations.	___ ___ ___
	32. Refer to TBRN5080 and Job Aid TBR2Q32J for adding additives to an aviation blend if this has not already been done.	___ ___ ___
	33. Shutdown P-1 Lead Plant circulation.	___ ___ ___
	34. Release railcar.	___ ___ ___
	35. Record closing TEL figures on TBRR8340; Aviation Fuel Ethylization Report.	___ ___ ___
SPH	36. Block lock and tag T-3214 and sample for finals.	___ ___ ___

****End of Detailed Procedure****

Ethyl system overview



HO Field Verification Table

Position	Action	√	Initial
Head Operator			
1.	Select one of the following conditions that apply to this document:		
1a.	All portions of this document are complete and field verified as correct.		
1b.	All portions of this document were completed as applicable with exceptions noted (due to transmitter failures, step not needed, etc.).		
1c.	This document will be revised based upon field verification. The suggested revisions are noted and have been submitted for correction.		
Management Representative			
2.	This document was implemented and completed according to ABU guidelines.		

2. Field verification is completed for each document requiring yearly review.
   Head Operator actions:
   2.a The Head Operator completes Field Verification Table and assigns a condition.
   2.b Depending on the condition do one of the following:

   Condition 1a: Deliver document to Management Representative.

   Condition 1b: Red line the document providing explanation for exceptions. Deliver to Management Representative.

   Condition 1c: Red line the document indicating changes or updates that reflect current operating practice. Deliver to Management Representative.

3. **Management Representative actions.**
   1. Ensure revisions, updates and / or changes are red lined in the document and forward to Manuals and Procedures to Include In EOM. This document will be returned to your location for filing.
   2. Ensure MOC is used to manage procedural step changes.

****End of Detailed Procedure****

Revision Record

Date	Step #	MOC#	Comments
10/25/07	All	17470	Original Issue.
11/5/2007	All		Incorporated Ethyl Corp recommendations.

Approval: Daryl Singleton	Date: 10/4/07

Purpose:

This checklist provides instructions for offload, de-pressure, and release a TEL B Aviation Mix Lead Car and adding Tetra Ethyl Lead (TEL), to an Aviation Gasoline mix. TEL stands for Tetra Ethyl Lead, the main component in this anti-knock mixture. TEL will be batch blended into T-3214, offload rail car completely.

Safety Precautions:

Standard Personal Protective Equipment required at all times.

Check all eye wash stations for proper working condition prior to off-loading TEL

This procedure has been reviewed in accordance with the 2008 APR Process.

When Educting material in the Lead Plant wear disposable earplugs and/or ear muffs.

Safety precaution when offloading TEL Tank Car:

- Leather gloves and shoes offer little to no protection against TEL.
- Chemical Goggles, for severe exposure add face shield or full face respirator.
- Poly coated Tyvek coveralls.
- Neoprene or Polyvinyl Chloride (PVC) gloves
- Rubber boots
- Hearing protection: disposable earplugs and/or earmuffs.
- TEL Aviation Mix is a mixture of Tetraethyl Lead, Kerosene, and about one-third 1,2 Dibromoethane (EDB), which is a known carcinogen.
- Respirator with organic vapor cartridge 75SCP100
  If exposure over the Permissible Exposure Limit (PEL) of 0.075 mg/m3 for TEL is expected, then supplied air is required. For EDB, Ethyl Corporation recommends a PEL of 0.1 ppm and OSHA sets a 30 ppm Ceiling. PEL's are based on 8 hour shifts.
- 5 gallon bucket of Kerosene (Pearl Oil) available for rinsing tools.

Establish at least 10 inches of vacuum before connecting or disconnecting loading arm.

Environmental Precautions:

Use a suitable sample container when testing valves for integrity.

Replace valve bleeder caps to comply with environmental regulations.

5 gallon bucket of Kerosene (Pearl Oil) available for absorbing accidental drips. Because TEL is toxic, drip leaks must be stopped right away.

References:

- Job Aid # TBR2Q32J:
  "Ethylizing an Aviation Fuel Mix (Adding Antioxidant, Dye, and TEL)".
- Training Film: "Lead Car Unloading".
- Training Film: "Safe Handling of Ethyl Anti-knock Compounds; Loading Anti-knock Bulk Containers; Unloading & Blending Anti-Knock Compounds".
- Ethyl Corporation Booklet: "Major Emergency Procedures" (Rev. Sept. 2006).
- MSDS #2647; Aviation Gasoline. Located in the MSDS Database.
- MSDS: # DV011762 TELB (TEL B Aviation Fuel Antiknock Additive), Ethyl Corporation. Located in MSDS Database.
- Synonyms: "TEL Aviation Mix"
  "Ethyl Antiknock Compound"
  "TEL"
  "Lead"
- MSDS: Kerosene (Pearl Oil)
- Primary Checklist, TBRN5075.

Prerequisites:

- T-3214 has been blended and sampled for B-4 specifications.
- Paperwork required: Aviation Ethylization Report, Lead Book.
- Required amounts of TEL are available.
- Lead Car spotted car on #10 spot.
- Tools: 11/16" Box End Wrench, Pipe wrench, Combination vacuum / pressure gauge with vent, metal pick (for gasket removal).
- Properly labeled Hazardous Waste drum on site for all TEL contaminated items.
- Operators working in Ethyl Plant have viewed Training films and read Ethyl Corporation Booklet: "Major Emergency Procedures" (Rev. Sept. 2006).

****Detailed Checklist Starts Below****

	Action	Initial
MTF	1. Review Aviation Ethylization Report with Head Operator.	____ ____ ____
RHO	2. Sign and approve Aviation Ethylization Report.	____ ____ ____
MTF	3. Verify railcar is labeled with the prefix ECDX.	____ ____ ____

NOTE: Ethyl Corporation will permanently assign two railcars with the prefix ECDX exclusively for Richmond deliveries. They have a new fleet scheduled for delivery early in 2008. When these railcar numbers are known they will be updated in this procedure.

MTF	4. Ensure railcar is spotted correctly.	____ ____ ____

WARNING

TEL tank cars contain a mixture of toxic substances with both immediate and delayed health effects. Lead is a cumulative poison. A large leak of TEL is an emergency. Exposure is immediately dangerous to life and health. (IDLH)

MTF	5. Inspect railcar for leaks or damage.	____ ____ ____
	6. If railcar is ok, isolate 50 track from switch engine.	____ ____ ____

WARNING

Failure to ground railcar before off loading results in static generation & build up. Failure to ground can lead to explosion and fire.

MTF	7. Secure railcar for off loading operations and attach bonding cable.	____ ____ ____
RHO	8. Visually inspect and release 50 track and railcar for offloading.	____ ____ ____
MTF	9. Inspect ramp for safe operation	____ ____ ____
	10. Break seal on dome and remove weigh card. Convert pounds to gallons and record on Ethylization report.	____ ____ ____

NOTE: Conversion table can be found on page 7 and 8 of this procedure.

MTF	11. Record gallons to offload. _____	____ ____ ____

SPH 12. Ensure T-3214 is set to circulate via T-3214 fill and the 1 lead. ____ ____ ____

MTF 13. Ensure Ethyl Plant Loop is set for circulation 1 Circ to 1 Lead. ____ ____ ____

14. Ensure valves: #9, #10 #14, #19, and #33 are opened, locked and tagged. ____ ____ ____

NOTE: To view a diagram of the referenced valve numbers refer to page 9 of this Procedure.

WARNING

Failure to use hearing protection when P-1 is discharging through Lead Skid eductor results in hearing loss which is cumulative over time. Refer to Safety Precautions on Page 1.

MTF 15. Establish T-3214 circulation on the 1 circ through Lead Skid Eductor. ____ ____ ____

16. Confirm G-1 is three times more then G-2. ____ ____ ____

NOTE: Normal operating pressure for G-1 is 360-400 PSIG. PSIG over 400 on G-1 is an indication of plugging in the eductor inlet. Normal operating pressure on G-2 is 85-100 PSIG.

MTF 17. Ensure at least 10" hg on G3. ____ ____ ____

WARNING

Lead is easily absorbed into the body through contact with the skin. Skin contact with organic lead can progress to toxic psychosis with delirium, convulsions, or even coma and is immediately dangerous to life and health. (IDLH)

MTF 18. Gather, inspect and don PPE. ____ ____ ____

NOTE: TEL Aviation Mix has a blue color and pungent odor even in tiny amounts.

WARNING

If TEL Mixture leaks in excess of the Permissible Exposure Limit (PEL), air-purifying respirators give EGRESS PROTECTION ONLY. Leaks in excess of the PEL will quickly saturate organic vapor cartridges and workers will inhale toxic lead. Only Fresh Air, such as SCBA, can protect people at this level of exposure.

MTF	19.	Inspect interior of dome to confirm that car can be offloaded.	___	___ ___
	20.	Install Combination gauge.	___	___ ___
	21.	Verify car has at least 3" of vacuum.	___	___ ___
	22.	If there is positive pressure in the rail car the car must be returned to Ethyl Corp.	___	___ ___

WARNING

Removing cover plate with positive pressure in the car may contaminate people and the environment with TEL.

MTF	23.	Connect off loading arm to car.	___	___ ___

WARNING

Opening flange cover toward your body may expose you to TEL spray which is immediately dangerous to life and health. (IDLH)

MTF	24.	Open flanges away from your body position.	___	___ ___
	25.	Check off loading arm for leaks.	___	___ ___
	26.	If a momentary loss of vacuum is observed, there is a leak in the section of piping between valve # 2a and valve #7. Confirm repairs are complete or if no leak is indicated, the system is ready for offloading.	___	___ ___
	27.	Reset Gallon meter and record totalizer. _____	___	___ ___

MTF 28. Establish flow from car to Lead Skid. ___ ___ ___

NOTE: Vacuum on G-3 will drop to 8-10 Hg when flow has been established. Pulling lead via Valve #2a and the barometric loop prevents lead from entering system without being metered. The Barometric loop will also break the siphon as lead will approach the top of the loop but not go over.

MTF 29. Vent railcar. ___ ___ ___

NOTE: As the lead level in the rail car drops it will begin to vortex and suck in air as this happens the 3" off loading hose will begin to jump. This is an indication that the railcar is nearly empty.

MTF 30. Secure from offloading. ___ ___ ___

31. Close combination gauge vent and re-establish a minimum 3" hg vacuum on railcar. ___ ___ ___

32. Record gallon meter reading. _____ ___ ___ ___

33. Gas wash Lead skid. ___ ___ ___

34. Disconnect offloading arm. ___ ___ ___

WARNING

Opening flange cover toward your body exposes you TEL spray and is immediately dangerous to life and health. (IDLH)

MTF 35. Open flanges away from your body position. ___ ___ ___

36. Secure from off loading operations. ___ ___ ___

37. Refer to TBRN5080 and Job Aid TBR2Q32J for adding additives to an aviation blend if this has not already been done. ___ ___ ___

38. Shutdown P-1 Lead Plant circulation. ___ ___ ___

39. Release railcar. ___ ___ ___

40. Record closing TEL figures on TBRR8340; Aviation Fuel Ethylization Report. ___ ___ ___

SPH 41. Block lock and tag T-3214 and sample for finals. ___ ___ ___

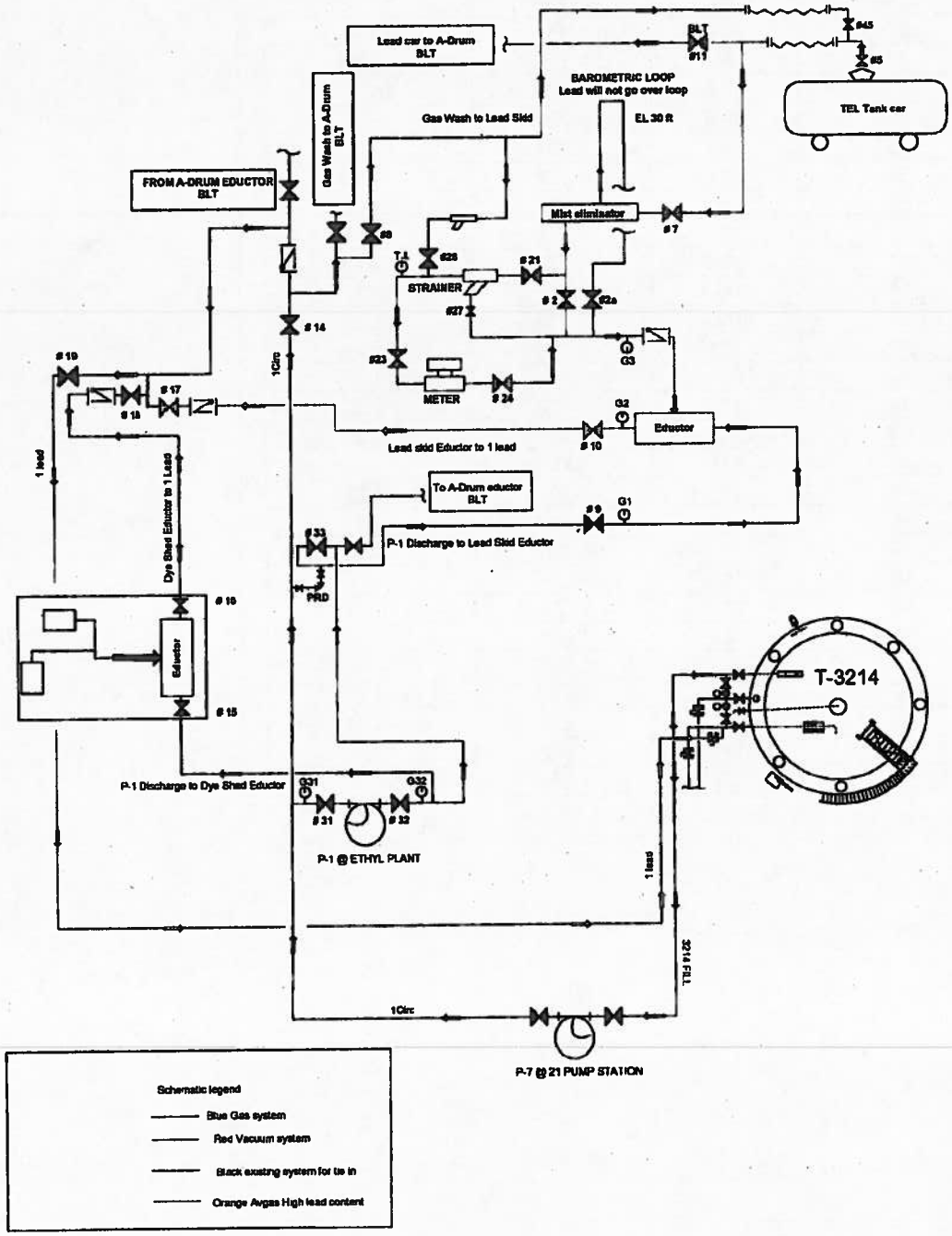
****End of Detailed Procedure****

NOTE: To convert received lbs to gals divide lbs by conversion factor listed under lb/gal. Example: 10000 @ 60.8 °F /14.63 = 683.5 gals. To convert metered gals to lbs multiply by conversion factor listed under lb/gal. Example: 683.5 gals @ 60.8 °F x 14.63 = 9999.6 lbs.

"Ethyl" Antiknock Compounds (International) Density g/ml. or kg/ liter and lb./gal.			
Temperature		TEL B	
°C	°F	kg/lit	lb/gal
-10	14		
-9	15.8	Freeze	Point
-8	17.6	1.792	14.96
-7	19.4	1.791	14.94
-6	21.2	1.789	14.93
-5	23	1.787	14.92
-4	24.8	1.786	14.9
-3	26.6	1.784	14.89
-2	28.4	1.783	14.88
-1	30.2	1.781	14.86
0	32	1.779	14.85
1	33.8	1.778	14.83
2	35.6	1.776	14.82
3	37.4	1.774	14.81
4	39.2	1.773	14.79
5	41	1.771	14.78
6	42.8	1.769	14.76
7	44.6	1.768	14.75
8	46.4	1.766	14.74
9	48.2	1.764	14.72
10	50	1.763	14.71
11	51.8	1.761	14.7
12	53.6	1.759	14.68
13	55.4	1.758	14.67
14	57.2	1.756	14.65
15	59	1.754	14.64
16	60.8	1.753	14.63
17	62.6	1.751	14.61
18	64.4	1.749	14.6
19	66.2	1.748	14.58
20	68	1.746	14.57
21	69.8	1.744	14.56
22	71.6	1.743	14.54
23	73.4	1.741	14.53
24	75.2	1.739	14.52
25	77	1.738	14.5
26	78.8	1.736	14.49

27	80.6	1.734	14.47
28	82.4	1.733	14.46
29	84.2	1.731	14.45
30	86	1.729	14.43
31	87.8	1.728	14.42
32	89.6	1.726	14.4
33	91.4	1.724	14.39
34	93.2	1.723	14.38
35	95	1.721	14.36
36	96.8	1.719	14.35
37	98.6	1.718	14.34
38	100.4	1.716	14.32
39	102.2	1.714	14.31
40	104	1.713	14.29
41	106	1.711	14.28
42	108	1.709	14.27
43	109	1.708	14.25
44	111	1.706	14.24
45	113	1.704	14.22
46	115	1.703	14.21
47	117	1.701	14.2
48	118	1.7	14.18
49	120	1.698	14.17
50	122	1.696	14.16
51	123	1.695	14.14
52	126	1.693	14.13
53	127	1.691	14.11
54	129	1.69	14.1
55	131	1.688	14.09

Ethyl system overview



HO Field Verification Table

Position	Action	√	Initial
	Head Operator		
1.	Select one of the following conditions that apply to this document:		
1a.	All portions of this document are complete and field verified as correct.		
1b.	All portions of this document were completed as applicable with exceptions noted (due to transmitter failures, step not needed, etc.).		
1c.	This document will be revised based upon field verification. The suggested revisions are noted and have been submitted for correction.		
	Management Representative		
2.	This document was implemented and completed according to ABU guidelines.		

2. Field verification is completed for each document requiring yearly review.
   Head Operator actions:
   2.a The Head Operator completes Field Verification Table and assigns a condition.
   2.b Depending on the condition do one of the following:

   Condition 1a: Deliver document to Management Representative.

   Condition 1b: Red line the document providing explanation for exceptions. Deliver to Management Representative.

   Condition 1c: Red line the document indicating changes or updates that reflect current operating practice. Deliver to Management Representative.

3. **Management Representative actions.**
   1. Ensure revisions, updates and / or changes are red lined in the document and forward to Manuals and Procedures to include in EOM. This document will be returned to your location for filing.
   2. Ensure MOC is used to manage procedural step changes.

****End of Detailed Procedure****

Revision Record

Date	Step #	MOC#	Comments
10/25/07	All	17470	Original Issue.
11/5/2007	All		Incorporated Ethyl Corp recommendations added Conversion table.
7/28/08	Safety		Added "Check all eye wash stations for proper working condition prior to off-loading TEL" to the Safety Precautions.

CONSEQUENCES OF DEVIATION FOR ETHYL PLANT

ETHYL PLANT

ETHYL PLANT									
COMPONENT	VARIABLE	NORMAL RANGE	DEVIATION	COMMENTS	PRIORITY	VERIFICATION	PROBABLE CAUSE	CONSEQUENCES OF DEVIATION	CORRECTIVE ACTION
A Drum	Weight	18,000 – 102,000 lbs	Outside of normal range <18,000 lbs >102,000 lbs		High	Fairbanks Scale. Low Beam Alarm (if set at minimum inventory of 18,000 lbs.). High Beam Alarm (if set at maximum inventory of 102,000 lbs.). Heat radiating from Drum.	Over ethylizing AvGas Mix. Not enough available room in drum when unloading IT Fluid (lead) Car.	<18,000 lbs Potential of removing Glycerine blanket and exposing lead sludge to atmosphere. Prolonged exposure of lead sludge to atmosphere will produce exothermic reaction. Potential explosion & fire. Environmental violation. >102,000 lbs Potential leaks due excessive weight. Overfill drum. Lead spill. Potential fire. Potential exposure to biohazard. Environmental violation.	<18,000 lbs Add Glycerine to Drum. Add lead to Drum. >102,000 lbs
A Drum	Temperature	Ambient temperature	>212°F >100°C	TEL AvGas fluid temperatures are typically not an issue unless heated from an external source, i.e. fire.	Emergency	Heat radiating from Drum.	Leak from Ethyl Plant loop resulting in fire.	Thermal decomposition with increased potential of explosion. Release of biohazard. Fire.	Ensure Drum is vented. Activate fire water deluge system
A Drum	Pressure	0 – 10" H_2O (vacuum)	>0" H_2O (>atmospheric pressure) >10" H_2O (vacuum)	During non-operation drum is at atmospheric pressures.	High	Pressure gauge on Drum.	>0" H_2O (>atmospheric pressure) Vent blocked in. Heating from environment. >10" H_2O (vacuum). Circulating Ethyl Plant loop for extended periods.	Over stress welds and drum appurtenances. Potential leaks. Potential fire. Potential exposure to biohazard. Environmental violation.	Vent Drum. Shutdown circulation of Ethyl Loop.

ETHYL PLANT

(Continued)

ETHYL PLANT									
COMPONENT	VARIABLE	NORMAL RANGE	DEVIATION	COMMENTS	PRIORITY	VERIFICATION	PROBABLE CAUSE	CONSEQUENCES OF DEVIATION	CORRECTIVE ACTION
A Drum eductor	Pressure	Unknown	Low differential pressure.	Low differential pressure across the eductor will reduce the vacuum pulling capacity of the system.	Low	Low noise level in Ethyl Plant. Low differential pressure upstream & downstream of eductor on Ethyl Plant loop. Inability to pull vacuum on Drum or greater time required.	Circulating stock with unusually high VP or gravity. Ethyl Plant loop is partially blocked in. P-1 pump discharge is partially blocked in. Return line to tank is partially blocked.	Inability or reduced ability to transfer TEL AvGas fluid. Failure to meet customer commitments. Loss profit opportunity	Ensure circulating appropriate tank. Open all valves on system fully. Ensure P-7 & P-1 are running.
P-1	Pressure	Unknown	Low discharge pressure. Low suction pressure.	Low suction or discharge pressure will reduce the differential pressure across the eductor.	Low	Low suction pressure reading on gauge. Low discharge pressure reading on gauge. P-1 discharge valve blocked or partially blocked in. Pump Cavitating.	P-7 at 21 Station not running or pump discharge blocked or partially blocked. Circulation tank suction blocked or partially blocked.	Inability or reduced ability to transfer TEL AvGas fluid. Failure to meet customer commitments. Loss profit opportunity	Ensure circulating appropriate tank. Open all valves on system fully. Ensure P-7 & P-1 are running.
Instrument Air	Pressure	9 psig	<9 psig	Instrument Air used for fire protection system.	High	Low instrument air reading on pressure gauge. Deluge System activated.	Loss of Yard Air. Leak in fusible plastic tubing. Loss of power to the solenoids that operate the Deluge system. Failure of the air controller on the fire water.	Loss of automatic fire protection. High sump levels under drum will alter the scale reading. Excessive amounts of water will overflow the sump and result in possibly lead contamination.	Block in the water supply. Restore instrument air pressure. Restore power to Ethyl Plant. Reset the controller.

CONSEQUENCES OF DEVIATION FOR LINES

TANKS
(Continued)

ADDITIVE TANKS									
TANK NUMBER	AREA	VARIBLE	DEVIATION	COMMENTS	PRIORITY	VERIFICATION	PROBABLE CAUSE	CONSEQUENCES OF DEVIATION	CORRECTIVE ACTION
D-6125, D-6047, D-1825 O/S	21 Pump Station	Level	Over TOP	Small additive tanks with 7 to 20 bbl capacities. No remote gauging or alarms.	Emergency	Observe liquid level using sight glass. Obtain a Stick Gauge on the tank.	Gauge glass unreadable. Gauge Stick unreadable. Tanks mismanifolding.	Potential tank damage. Fire hazard. Environmental violation.	Stop flow into tank. Lower level below TOP.
D-6125, D-6047, D-1825 O/S	21 Pump Station	Temperature	High	Excessive temperatures not an issue for these tanks	N/A	N/A	N/A	N/A	N/A
			Low		Medium	Observe level in sight glass. (no or very slow movement of meniscus)	Low additive temperature (increases viscosity of stock)	Potential damage to gear pump. Off Test AvGas Blend.	Circulate tank.
D-6125, D-6047, D-1825 O/S	21 Pump Station	Flow	Flow under a no flow condition.	Unexpected flow	High	Observe level in sight glass.	Mismanifolding	Potential tank overfill. Potential tank damage. Potential fire hazard. Potential environmental violation	Stop flow into tank. Double check setup.
AO-22 Tote Bin Blue Dye Tote Bin	SP Hill (Ethyl Plant)	Level	Over TOP	Small additive tanks. No remote gauging or alarms.	Emergency	Observe liquid level using sight glass.	Inattention - Human factors	Hazardous waste clean up	N/A
AO-22 Tote Bin Blue Dye Tote Bin	SP Hill (Ethyl Plant)	Temperature	High	Excessive temperatures not an issue for these tanks	N/A	N/A	N/A	N/A	N/A
			Low		Medium	Observe level in sight glass. (no or very slow movement of meniscus)	Low additive temperature (increases viscosity of stock)	Potential damage to gear pump. Off Test AvGas Blend.	Circulate tank.
AO-22 Tote Bin Blue Dye Tote Bin	SP Hill (Ethyl Plant)	Flow	Flow under a no flow condition.	Unexpected flow	High	Observe level in sight glass	Mismanifolding	Potential tank overfill. Potential tank damage. Potential fire hazard. Potential environmental violation	Stop flow into tank. Double check setup.

- Enclosed or confined spaces
- Falling objects
- Fire
- Hydrocarbon release to environment
- Radiation exposure
- Tripping

For detailed instructions on maintenance and construction related safety issues access the following Refinery Instructions on the Richmond Refinery Web Page:

- Preparation of Equipment for Shop Repairs or Storage, RI-304
- Hot Work and General Work Permits, RI-341
- Safe Work Practices, RI-374
- Release of Operating Equipment for Mechanical Work, RI-9900
- General procedure for Entering and Working in Enclosed or Confined Spaces, RI-9920.

Material Handling Hazards

Most product materials within Transfer & Blending can be considered hazardous. Motor Gas, Aviation Gas, and their components are extremely flammable liquids with flash points at less then ambient temperatures. Jet and Diesel fuels are combustible liquids with a flash point range between 100° and 125°F.

In addition, some materials are toxic. For detailed information on these materials, reference the Material Safety Data Sheets (MSDS) from **Table 3-1, T&B Refine Material Hazards and Locations**, below. This table identifies hazardous materials, their locations, and MSDS numbers. The MSDS Sheets can be viewed from the Refinery Web Page or from the MSDS binder located in the Transfer & Blending Control Room.

Table 3-1, T&B Refine Material Hazards and Locations

Material Hazard	Location	MSDS # or Substance ID #
Benzene (0.4 - 4.5% in Reformate, Motor Gas, and Aviation Gas)	Main Tank Field: 8 Gas, 27 Gas, 48 Line, 40-41 Gas, 102 Line, 105 Line, 113 Line, 122 Line, 206 Line, 274 Line, 10DL, 13 DL, 14 DL, 16 DL, 634 Suc, 1296 Suc, 3072 Suc, T-634, T-1296, T-1459, T-1488, T-1514, T-3191, T-3072, T-3073, T-3214, T-3075 SP Hill: KMPL & BAPL, PUL Rax, MUL Rax, RUL Rax, 9 Whf, 10 Whf, 12 Whf, T-953, T-990, T-991, T-992, T-1635, T-1637, T-1687, T-1688, T-3071, T-3133, T-3134, T-3189.	005117 (Benzene)

2a

Material Hazard	Location	MSDS # or Substance ID #
	21 Pump Station: KM #1, #2, BAPL	
TEL B Aviation Fuel Antiknock Additive (In Aviation Gas)	Ethyl Plant: A Drum, 1 Circ-1Lead Main Tank Field: 32 Gas, 34 Gas, T-1444, T-3075, T-3214, T-3191 SP Hill: AvGas Rax, T-1645 21 Pump Station: P-7, P-2, 1-8 Whf, 5 Whf	S1817 (Substance ID number) 002647 (Aviation Gasoline 100)
Toluene (In Aviation Gasoline)	Main Tank Field: 32 Gas, 34 Gas, 1-8 Whf, 5 Whf, T-1289, T-3075, T-3214, T-3191 SP Hill: AvGas Rax, T-1645	002900
Anhydrous Ammonia (NH_3)	Process Plants: Isomax	002501
Hydrogen Sulfide (H_2S)	Process Plants Crude: Quarry tank field, Poleyard, 15 Pump Station. SP Hill: 8 Pump Station.	000301
Nitrogen (N_2)	Nitrogen Fill Station. Tanks undergoing nitrogen purge or O.O.S. (Out of Service) for repairs.	000950

For a complete list of the chemicals and MSDS's found in Transfer & Blending, Refine subsection, refer to **Table 3-2 List of Material Names and MSDS or Substance ID Numbers**.

Material Safety Data Sheets (MSDS)

Material Safety Data Sheets (MSDS) provide critical information for all potentially hazardous chemicals present in the Transfer & Blending (Refine) area. The MSDS Sheets are accessed from the Refinery Web Page or from the MSDS binder located in the Transfer & Blending Control Room. The MSDS provides the following information for each chemical:

- Trade names
- Hazardous ingredients
- Physical and chemical characteristics
- Fire and explosion hazard data
- Know acute and chronic health effects and related health information
- Exposure limits
- Spill or leak procedures
- Personal protective equipment requirements
- Special precautions for handling or using hazardous chemicals

- Who to contact for further details

Table 3-2, List of Material Names and MSDS or Substance ID Numbers

Material Name	Central MSDS Number	Substance ID number
Alkylation Naptha, Full Range (Whole Alky)	6101	
Alkylation Naptha, Light (Rerun Alky)	CV004219	
Asbestos	302	
Chevron Antifreeze / Coolant	7425	
Unisol7 Liqiud Blue AG	DV013583	
Aviation Gasoline 100 Octane (AvGas 100)	2647	
Butane	8223	
Benzene	10101	
Chevron Delo 100 Motor Oils	7329	
Chevron EP Industrial Oil 46X	4618	
Chevron Cylinder Oil 460X	7673	
Chevron Neutral Oil 100R	6986	
Chevron Neutral Oil 100RLV	6986	
Chevron Neutral Oil 220R	6986	
Chevron Neutral Oil 600R	6986	
Chevron Mid-Grade Unleaded Gasoline	3205	
Univar USA Inc. Solvent 51L	CV008519	
Chevron Premium Unleaded Gasoline	2653	
Chevron Thinner 225R	DV000434	
Chevron UCBO 4R	8133	
Chevron UCBO 5R	6947	
Chevron UCBO 7R	8133	
Chevron Regular Unleaded Gasoline	2655	
Diesel Fuel (Generic)	2916	
Dupont Antioxidant No. 22 (AO-22)	DV008631	S1967
Dupont Corrosive Inhibitor (DCI)-4A	DV013449	S44069
Dupont Metal Deactivator (DMD)No. 2	DV013094	S37394
Ethyl Hitec 4103 Fuel Additive		S40729
Glycerine Triglycidyl Ether		C13236027
Hydrobate		S9686
Hydrogen Peroxide 35%		S47566
Insulating Oil		S5896
Isomerate	007073	
Hydrogen Sulfide (H_2S)	000301	
Jet Fuels	000513	

Table 3-2, List of Material Names and MSDS or Substance ID Numbers

Material Name	Central MSDS Number	Substance ID number
Lead Acetate - In Batteries		S49731
Lead Based Paint		S49781
Man-Made Mineral Fibers		S40290
Mercury-In-Glass Thermometer		S49729
Nalco Aviation Gasoline Antioxidant		EC5205A
Nalco Antifoulant (In Tetramer-12)		EC3050A
Nickel Cadmium - In Batteries		S49730
Nitrogen, Compressed Gas	004915	
Nitrogen , Liquid (N2)	000950	
Penhex	002802	
Pentane	005035	
Polychlorinated BiPhenyls (PCBs)		S10826
Potassium Permanganate (Solid)		C7722647
Propylene Tetramer – 12 (Tetramer)	004293	
Recovered Oil	2795	CPS279150
Refinery Inert Gas	001095	
Reformate, Full Range (Reformate)	005117	
Stadis 450 Conductivity Improv		S31841
TEL B Aviation Fuel Antiknock Additive (TEL, AvGas Lead)	DV011762	S1817
Toluene	002900	
Waste Water / Oils	002638	

Process Plant Hazards

Due to the proximity of several process plants, there is a potential for exposure to uncontrolled releases or events. These plants are generally located North and West of the T&B tank fields and are within FCC, D&R, and U&E operational areas.

Types of releases can include Hydrogen Sulfide, Liquid Petroleum Gas (LPG), Anhydrous Ammonia, and Sulfuric Acid. Pay attention to wind direction. Familiarize yourself with the Emergency Action Plan and the Emergency Notification System. Know your evacuation routes and assembly points.

For additional information, refer to the following Refinery Instructions:

- Emergency Action Plans, RI-480
- Emergency Communication System, RI-470
- Evacuation Procedures, RI-505
- T&B Refine Area Evacuation Checklist, TBRE401

3.4 Personnel Safety Issues

This section describes protective measures needed to ensure personal safety and the safety of others. This section is divided into the following subsections:

- General Safety Rules
- Personal Safety Equipment
- Color Coding of Lines and Valves
- Controlled Entry and Smoking

General Safety Rule

The General Safety Rules are designed to help personnel prevent accidents and properly treat injuries. Specific rules may be added to these general rules as conditions require. All employees must comply with these rules.

The General Health & Safety Policy can be accessed thru HES on the Richmond Refinery Web Page.

Personal Safety Equipment

The Transfer & Blending Refine side has the following general types of equipment to protect personnel:

- Personal Protective Equipment (PPE)
- Respiratory Protective Equipment (RPE)
- Safety Showers & Eye Wash Stations
- Color coding of valves, lines, and equipment

Personal Protective Equipment (PPE)

The minimum PPE required for an operator in the field is hard hat, safety glasses, Nomex coveralls, and boots or sturdy shoes. The following additional PPE may be required depending on the job task:

- Chemical resistant apron, boots, or gloves: Provides protection against chemicals that are corrosive or toxic. They are usually made out of materials such as Nitrile, Viton, Polyvinyl alcohol, or Polyethylene Vinyl Alcohol.
- Chemical goggles: Provides eye protection when there is a potential for splashing with toxic or corrosive chemicals. Where chemical injury to the face is possible, a face shield must also be worn.
- Face shield: Provides protection to the face and neck when there is a potential for splashing with toxic or corrosive chemicals. Face shields cannot be used as a substitute for goggles.
- Hearing protection: Provides protection against high noise levels. Hearing protection is required inside orange lined areas. The Ethyl Plant, 17 Pump Station, and 21 Pump Station have orange lined areas. Earplugs, earmuffs, and

canal caps are used (or a combination of) depending on the level of protection needed.

Respiratory Protective Equipment (RPE)

RPE provides protection against inhalation hazards and oxygen deficient environments. There are three basic types of RPE used at the Refinery: air-purifying respirator, air-supplied respirators, and powered air-purifying respirators.

At Transfer & Blending, air-purifying and air-supplied respirators are used. Scott Air Paks may be required when descending onto a floating tank roof or entering out of service tanks. Scott Air Paks are stored in either black carrying cases or mounted in green plastic cabinets.

It should be noted that Scott Air Paks located in the field are for emergency use only. Scott Air Paks used for routine or maintenance type work should be checked out from the Central Tool Room.

A selection guide for respiratory equipment can be found in Refinery Instruction RI-338: Respiratory Protection Equipment, Appendix II.

Safety Showers and Eye Wash Stations

There are several safety shower and eye wash stations located throughout Transfer & Blending. These stations are located in areas where there is a high splash potential such as sample and pump stations. The stations are checked monthly for operation and accessibility.

Refer to **Table 3-3, Location of Personal Safety Equipment**, for the type and location of PPE, RPE, and Safety Showers.

Table 3-3, Location of Personal Safety Equipment

Safety Equipment	Main Tank Field	21 Pump Station	SP Hill	Ethyl Plant
Ear Plug Boxes	At Comparator Building 634 Manifold near P-27	Near P-1 Midway entrance to 21 PS Midway entrance to 21A PS Near BAPL Near P-18 Near SPPL & BAPL Boundary	–	Entrance to A Drum shed.
Half Mask respirators	At Comparator Building 634 Manifold near circuit breakers 634 Manifold near P-27	Near P-1 Midway entrance 21 PS Midway entrance 21A PS Near BAPL Near P-18 Near SPPL & BAPL Boundary	–	–
Safety Showers Eye Wash Stations	634 Manifold at P-36 634 Manifold near Lower Boundary T-3180 634 Manifold back of #1	Near P-1 Near BAPL Filter 21A Station Shack On Midway at 21 Station Behind D-4190 Jet Additive Pumps	–	Dye Shed Near P-3

Table 3-3, Location of Personal Safety Equipment

Safety Equipment	Main Tank Field	21 Pump Station	SP Hill	Ethyl Plant
	Header	Additive Day Tanks		
Scott Air Paks	L13P1 & L13P-2 at 634 Manifold CTR4 in Truck #51-976	L14P1 next to 21A Shack L01P10 in Truck #51-983	L01P10 in Truck #50-989	#1 & #2 in Ethyl Plant Office T1P9 at #10 Spot L10P1 Dye Shed L10P2 near P-3
Tyvek Coveralls	–	–	–	Inside Ethyl Plant Office

All safety equipment is inspected monthly. To view the required inspections refer to the appropriate Routine Duty documents that can be viewed by accessing the Refinery Web Page. From the Refinery Web Page go to Opts & Mnt Manuals/B&S/T&B Refine/Routine Duties.

Color coding of valves, lines, and equipment

RI-302, Color Identification and Labeling of Equipment and Pipelines is used to identify types of equipment and their service. In addition, areas marked by colored stripping may be used to designate hazardous areas that require special PPE.

Table 3-4, Equipment Color Codes, associates colors with types of equipment.

Table 3-5, Painted Stripping Codes, associates colored stripping with particular hazard or conditions. **Table 3-6, Valve Color Codes**, associates colors with valve service.

Table 3-4, Equipment Color Codes

Color	Type of Equipment
Red	Fire Equipment
	Primary field shutdown devices: LSHH Magnitrols and FSL DP cells
	Field emergency shutdown stations
Yellow	H_2S piping
	Lines on concrete to define chemical hazard area
	Chemical Hazard Areas and Hazardous chemical piping; Sodium polysulfide
Orange	High Noise Area
Black	Foam Stations
Blue	Root valves for all nitrogen connections
Purple	All removable spools and temporary piping
Green	Safety equipment
White	Off-plot LPG piping.

Table 3-5, Painted Stripping Codes

Color	Hazard or Condition
Yellow Lines	Designates chemical hazard area.
Orange	Designates high noise area.
Double White	Designates walkways where hard hats and safety glasses not required.

Table 3-6, Valve Color Codes

Color	Valve Service
Pink	Valves in wash oil lines
Gray	Valves in pumpout lines
Brown	Valves in seal oil lines
Black	CS valves in lube oil lines
Black	Valves in flush oil lines
Orange	Valves in Dimethyl Sulfide lines

Controlled Entry & Smoking

Controlled Entry

The purpose of entry control is to account for all personnel in the field. This is critical for emergency evacuations. Personnel (area operators being exempt) wishing to enter Transfer & Blending operating areas must fill out the Entry / Exit Logbook located at the T&B Control House. When exiting, they must sign out.

Before filling out the Entry / Exit Logbook, personnel must contact the Area Operator or the Refine Head Operator. Permission must be granted before working on any equipment or visiting any operational areas. Visitors are required to wear minimum PPE when spending greater then 20 minutes in an operating area. Minimum PPE is hard hats, safety glasses, Nomex coveralls and long sleeves. Refer to Refinery Instruction RI-375 - "Control of Entry into Process Area".

Smoking

Smoking in the field and inside refinery buildings is prohibited. Smoking is permitted only in specific areas that have been approved by Plant Protection. These areas are called Smoking Posts. Smoking post permits are issued annually by Plant Protection personnel. The T&B Smoking Post is located behind the Control House on the North end.

Ethyl Plant Deluge System

The Ethyl Plant, specifically A Drum, is protected by a sprinkler deluge system. A Drum is draped with fusible plastic tubing. The tubing is pressured to 15 psi from an instrument air source. At temperatures above 130°F, the tubing melts and air pressure is loss. When the pressure falls below 9 psi, a control valve on the firewater system opens which delivers water to the sprinklers. The control valve is located near the parking area, to the left as you enter the catwalk. When the system is activated, audible and visual alarms are displayed on the Honeywell Console and on the Jet Blender PanAlarm (EPSA alarm) located in the Control House. To reset the control valve, temporarily plug hole at the test station to rebuild air pressure. The test station is located at the control valve.

The system is tested monthly by the operator using Routine Duty Tbrr8514. Before testing the system, notify the Refine Board Operator. At the test station, turn indicator to the Test Mode. This should open the control valve sending water to the sprinklers. Also, note that when the control valve is open a small stream of water is emitted from the valve body. Reset the valve as noted in the paragraph above.

Foam Manifolds

Foam manifolds provide hookups for trucks that mix and pump foam. They are usually painted black. The associated piping delivers the suppressent to the inside of a tank perimeter by either cascading down the tank shell or by direct injection between the primary and secondary seals. Foam manifolds are located away from the tank but are accessible from the road.

Foam Station

Foam stations deliver suppressant to pump manifolds and other equipment. The major pieces of equipment at a form station are the foam tank and monitor. When the monitor is opened, foam is pulled from the tank and mixed with firewater at pre-set ratios. See the Routine Duties listed below (at the end of this section) for locations of foam manifolds and foam stations.

Monitors

Monitors are strategically located throughout the Refine side. Most can be found at pump stations and manifolds where they can be turned on, in a fixed position, and left unattended. They are designed to protect major pieces of equipment such as pumps, manifolds, compressors, and exchangers.

Hydrants

The Refine side areas are ringed with the refinery firewater system. The hydrants allow hose and fire truck hookups to this system in areas that otherwise would be unprotected.

1½ " Hose Boxes

1" Hose Reels and 1½"Hose Boxes are located in pump stations and manifold areas. They provide additional fire fighting capacity in areas that have a potential for quick transition beyond incipient stage. Hose Reels and Hose Boxes are not intended for plant wash downs.

800-403-0044 N.A.
804-648-7727 OTHER

TELB-03/14/00

ETHYL(R*)

ETHYL CORPORATION

MATERIAL SAFETY DATA SHEET

(800) 403-0044 (US & CANADA)
(804) 648-7727 (INTERNATIONAL)

------1. COMPANY AND PRODUCT IDENTIFICATION ------

PRODUCT NAME: TEL B AVIATION FUEL ANTIKNOCK ADDITIVE

MANUFACTURER/SUPPLIER:
ETHYL CORPORATION
330 SOUTH FOURTH STREET
RICHMOND, VA 23219
1-800-325-7079

SYNONYMS:
TEL AVIATION ANTIKNOCK
ALKYL LEAD COMPOUND
ANTIKNOCK COMPOUND
LEAD ANTIKNOCK COMPOUND

CHEMICAL FAMILY:
ORGANIC LEAD
TETRAALKYL PLUMBANES

CHEMICAL FORMULA: MIXTURE
(C2H5) 4 Pb
(C2H4) Br2

PRODUCT USE: MOTOR FUEL ANTIKNOCK MIXTURE FOR USE ONLY AS A FUEL ADDITIVE

------2. COMPOSITION/INFORMATION ON INGREDIENTS ------

CHEMICAL NAME	CAS NO.
TETRAETHYL LEAD (TEL)	78-00-2

DERMAL LD50: 200 - 1500 MG/KG (RABBIT).
FISH LC50: 0.15 PPM (96 HR.) (BLUEGILL).
INHALATION LC50: 0.85 MG/L (RAT).
ORAL LC50: 29 MG/KG (RAT).

1,2 DIBROMOETHANE	106-93-4

DERMAL LD50: 300 MG/KG (RABBIT)
FISH LC50: 18 PPM TLM (BLUEGILL SUNFISH)
INHALATION LC50: 200 PPM (2 HR ALD).
ORAL LC50: 140 MG/KG (RAT).

KEROSENE 8008-20-6

ORAL LD50: >5,000 MG/KG (RAT).
INHALATION LC50: >5,000 MG/M3 (RAT).

CHEMICAL NAME	NOTE	EXPOSURE LIMIT
TETRAETHYL LEAD (TEL)	ND	0.075 MG/M3 (AS Pb) TWA8, SKIN (OSHA); 0.1 MG/M3 TWA8, SKIN (ACGIH).
1,2 DIBROMOETHANE	@#+	20 PPM TWA8, 30 PPM CEILING (OSHA); ACGIH SKIN DESIGNATION; ETHYL RECOMMENDS 0.1 PPM TWA8.
KEROSENE	ND	NOT ESTABLISHED BY OSHA/ACGIH.

NOTE:
CARCINOGENICITY LISTING OF COMPONENTS AT CONCENTRATIONS GREATER THAN OR EQUAL TO 0.1% INDICATED BY:
@=NTP
#=IARC
&=OSHA
+=ACGIH
*=OTHER
ND=NOT DESIGNATED.

SEE REGULATORY INFORMATION AT THE BACK OF THE MSDS FOR WHMIS INFORMATION.

------3. HAZARDS IDENTIFICATION ------

THIS PRODUCT IS HAZARDOUS UNDER THE CRITERIA OF THE OSHA HAZARD COMMUNICATION RULE, 29 CFR 1900.1200.

MAY BE FLAMMABLE!
CANCER HAZARD!
SKIN AND EYE IRRITANT.
HIGHLY TOXIC BY INHALATION, INGESTION, AND SKIN ABSORPTION.
SEE "FIRE AND EXPLOSION HAZARDS."
SEE "HEALTH HAZARDS."

HMIS CLASS HEALTH 3
HMIS CLASS FLAMMABILITY 2
HMIS CLASS REACTIVITY 1

APPEARANCE/ODOR:
BLUE OR WHITE OR ORANGE OR RED LIQUID WITH A MUSTY, SWEET AROMATIC ODOR.

------4. FIRST AID MEASURES ------

INHALATION:
REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION, PREFERABLY MOUTH-TO-MOUTH. IF BREATHING IS DIFFICULT, GIVE OXYGEN. GET MEDICAL ATTENTION.

EYE CONTACT:
IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.
GET MEDICAL ATTENTION.

SKIN CONTACT:
IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. FOLLOW UP WITH A SOAP AND WATER WASH AS SOON AS POSSIBLE. SCRUB WITH A TOWEL SATURATED WITH KEROSENE (IF AVAILABLE) OR A "WATERLESS HAND CLEANER" FOLLOWED BY A WARM WATER SHOWER WITH SOAP TO REMOVE ANY REMAINING TETRAETHYL LEAD AND KEROSENE. A SURGICAL SCRUB BRUSH CAN BE USED TO MECHANICALLY CLEAN THE SKIN, FINGERNAILS AND TOENAILS. GET MEDICAL ATTENTION IMMEDIATELY. CONTAMINATED CLOTHING AND SHOES SHOULD BE DESTROYED.

INGESTION:
GIVE TWO GLASSES (16 OUNCES) OF WATER THEN INDUCE VOMITING BY STICKING FINGER DOWN THROAT. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. GET MEDICAL ATTENTION IMMEDIATELY.

------5. FIRE FIGHTING MEASURES ------

FLASH POINT (METHOD):
13C/55F TO 108C/226F (TCC). CLOSED CUP FLASH POINTS ARE UNPREDICTABLE DUE TO TRACE AMOUNT OF LOW BOILERS.

FLAMMABLE LIMITS: 6.6 VOLUME % IN AIR (CALCULATED LOWER ESTIMATE).

EXTINGUISHING MEDIA: DRY CHEMICAL, WATER SPRAY (FOG), FOAM OR CARBON DIOXIDE.

HAZARDOUS THERMAL DECOMPOSITION PRODUCTS:
INCLUDE OXIDES OF CARBON AND INORGANIC LEAD FUMES AND HYDROGEN HALIDES.

SPECIAL FIRE FIGHTING PROCEDURES:
USE WATER SPRAY OR FOG TO COOL EXPOSED EQUIPMENT AND CONTAINERS.
DO NOT BREATHE SMOKE OR VAPORS.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
WHEN HEATED ABOVE 100C/212F MAY UNDERGO A SELF-ACCELERATING, EXOTHERMIC REACTION WHICH CAUSES A RAPID RISE IN TEMPERATURE AND PRESSURE. RUPTURE OF STORAGE VESSELS AND FIRE SHOULD BE ANTICIPATED IN CASE OF SUCH TEMPERATURE.

------6. ACCIDENTAL RELEASE MEASURES ------

SPILL INFORMATION:
VENTILATE ENCLOSED AREAS. REMOVE SOURCES OF IGNITION. CONTAIN ANY SPILLS WITH DIKES OR ABSORBENTS TO PREVENT MIGRATION AND ENTRY INTO SEWERS OR STREAMS. TAKE UP SMALL SPILLS WITH DRY CHEMICAL ABSORBENT. LARGE SPILLS MAY BE TAKEN UP WITH PUMP OR VACUUM AND FINISHED OFF WITH DRY CHEMICAL ABSORBENT. HARD SURFACES MAY BE DECONTAMINATED BY THOROUGH SCRUBBING WITH A 5-10% SOLUTION OF HYPOCHLORITE BLEACH. MONITOR ATMOSPHERE ABOVE SPILL LOCATION WITH LEAD-IN-AIR KIT TO CONFIRM ADEQUATE CLEAN UP.

------7. HANDLING AND STORAGE ------

HANDLING PRECAUTIONS:
DO NOT GET IN EYES, ON SKIN, OR CLOTHING. DO NOT TAKE INTERNALLY. WASH THOROUGHLY AFTER HANDLING. DO NOT BREATHE VAPOR. USE ONLY WITH ADEQUATE

VENTILATION. KEEP AWAY FROM HEAT, SPARKS, OPEN FLAME, AND FIRE.

STORAGE REQUIREMENTS:
STORE CONTAINERS IN COOL, DRY, WELL-VENTILATED AREA AWAY FROM SOURCES OF IGNITION. KEEP CONTAINERS CLOSED WHEN NOT IN USE.

------8. EXPOSURE CONTROL, PERSONAL PROTECTION ------

EXPOSURE LIMITS:
NOT ESTABLISHED FOR MIXTURE.
(SEE SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS).

EYE PROTECTION:
CHEMICAL GOGGLES FOR PRIMARY PROTECTION FOR SEVERE EXPOSURE ADD FACE SHIELD.

PROTECTIVE GLOVES: NEOPRENE OR POLYVINYL CHLORIDE.

RESPIRATORY PROTECTION:
NIOSH APPROVED ORGANIC VAPOR RESPIRATOR. IN EMERGENCY SITUATION, NIOSH APPROVED SELF CONTAINED BREATHING APPARATUS (SCBA).

LOCAL EXHAUST VENTILATION: AT SOURCE OF VAPOR.

MECHANICAL VENTILATION: RECOMMENDED.

OTHER:
IF SKIN CONTACT OR CONTAMINATION OF CLOTHING IS LIKELY, CHEMICAL RESISTANT PROTECTIVE CLOTHING SHOULD BE WORN.

------9. PHYSICAL AND CHEMICAL PROPERTIES ------

BOILING POINT: DECOMPOSES VIOLENTLY BEFORE BOILING POINT.

SOLUBILITY IN WATER: 1,2-DIBROMOETHANE (3.5 G/L); TEL (0.2 MG/L).

SPECIFIC GRAVITY: 1.745 AT 20C/68F.

MOLECULAR WEIGHT: 323.45 (TEL)

VISCOSITY: 0.58 CST AT 20C.

------10. STABILITY AND REACTIVITY ------

STABILITY: UNSTABLE AT TEMPERATURES GREATER THAN 100C/212F.

CONDITIONS TO AVOID: HIGH TEMPERATURES, SPARKS, AND OPEN FLAMES.

MATERIAL TO AVOID:
STRONG OXIDIZING AND REDUCING AGENTS, HALOGENS, AND CONCENTRATED ACID.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR.

------11. TOXICOLOGICAL INFORMATION ------

THIS PRODUCT CONTAINS MATERIALS THAT CAN BE ACUTELY TOXIC ORALLY, DERMALLY OR BY INHALATION. COMPONENTS ARE EYE AND SKIN IRRITANTS AND ARE UNTESTED FOR

ANIMAL SENSITIZATION. THE PRODUCT CONTAINS LISTED CARCINOGENS AND MATERIALS THAT MAY AFFECT MALE AND FEMALE REPRODUCTION AND THE UNBORN. AMONG THE TARGET ORGANS POSSIBLY AFFECTED FROM OVEREXPOSURE ARE THE CENTRAL NERVOUS SYSTEM, LIVER, KIDNEY, BLOOD FORMING ORGANS, AND CARDIOVASCULAR SYSTEM. HAZARDS OF SPECIFIC COMPONENTS ARE AS FOLLOWS:

ORGANIC LEAD COMPONENTS:
TOXIC EFFECTS EXPECTED IN ANIMALS FROM SHORT EXPOSURES BY INHALATION, INGESTION, OR SKIN CONTACT WOULD BE LARGELY DUE TO THE ORGANIC LEAD INGREDIENTS. INITIAL HUMAN HEALTH EFFECTS FROM OVEREXPOSURE BY THE SAME ROUTES COULD INCLUDE SUBTLE CENTRAL NERVOUS SYSTEM EFFECTS SUCH AS INSOMNIA OR MOOD CHANGES. THESE SIGNS COULD PROGRESS TO TOXIC PSYCHOSIS WITH DELIRIUM, CONVULSIONS OR COMA IF EXPOSURE IS CONTINUED OR INCREASED. HIGHER EXPOSURE COULD ALSO CAUSE SIGNS OF NONSPECIFIC DISCOMFORT, SUCH AS NAUSEA, HEADACHE, OR WEAKNESS. ABNORMAL LIVER FUNCTION AS INDICATED BY LABORATORY TEST, AND PULMONARY EDEMA COULD OCCUR FROM GROSS OVEREXPOSURE. DEATH COULD RESULT FROM THE PULMONARY EDEMA OR NEUROLOGICAL EFFECTS. HUMAN SENSITIZATION HAS NOT BEEN REPORTED. INDIVIDUALS WITH PREEXISTING DISEASES OF THE CENTRAL NERVOUS SYSTEM, LIVER OR KIDNEY COULD HAVE INCREASED SENSITIVITY TO TOXICITY FROM OVEREXPOSURE. ETHYL RECOMMENDS HANDLING PRODUCTS CONTAINING ORGANIC LEAD COMPONENTS AS POTENTIAL HUMAN DEVELOPMENTAL AND MALE AND FEMALE REPRODUCTIVE TOXICANTS. AN EPIDEMIOLOGY STUDY OF WORKERS IN TEL MANUFACTURING HAS SHOWN AN INCREASE IN THE NUMBER OF RECTAL CANCERS. ANOTHER EPIDEMIOLOGY STUDY WAS CONDUCTED BY JOHN HOPKINS UNIVERSITY, OF WORKERS IN TETRAETHYL LEAD MANUFACTURING. THE RESEARCHERS CONCLUDED THAT THE EMPLOYEES WHO MOST LIKELY HAD LONG TERM HIGH EXPOSURES TO TEL HAD LOWER PERFORMANCE IN NEURO-BEHAVIORAL TESTS INVOLVING VERBAL MEMORY, ATTENTION, AND EYE-HAND COORDINATION. HOWEVER, IN VIEW OF STUDY AND INTERPRETIVE SHORT COMINGS, THE COMPANY INVOLVED BELIEVES THAT THE FINDINGS DO NOT PROVIDE SUBSTANTIVE EVIDENCE THAT EXPOSURE TO LEAD ALKYLS CAUSED THESE NEUROBEHAVIORAL EFFECTS.

ETHYLENE DIBROMIDE:
TOXIC EFFECTS DESCRIBED IN ANIMALS FROM SHORT EXPOSURES BY INHALATION, INGESTION, OR SKIN CONTACT INCLUDE LIVER AND LUNG EFFECTS. TESTS IN SOME ANIMALS DEMONSTRATE CARCINOGENIC ACTIVITY. TEST IN BACTERIAL OR MAMMALIAN CELL CULTURES DEMONSTRATE MUTAGENIC ACTIVITY. TESTS FOR REPRODUCTIVE TOXICITY IN ANIMALS HAVE BEEN INCONCLUSIVE, WITH POSITIVE RESULTS IN SOME STUDIES, AND NEGATIVE RESULTS IN OTHERS. HUMAN HEALTH EFFECTS OF OVEREXPOSURE BY INHALATION, INGESTION, OR SKIN OR EYE CONTACT MAY INITIALLY INCLUDE: NON-SPECIFIC DISCOMFORT, SUCH AS NAUSEA, HEADACHE, OR WEAKNESS.

HIGHER EXPOSURES MAY LEAD TO:
EYE IRRITATION WITH DISCOMFORT AND TEARING OR BLURRING OF VISION; ABNORMAL LIVER FUNCTION WITH NAUSEA OR VOMITING, REDUCED APPETITE, OR ABDOMINAL PAIN OR IRRITATION OF THE UPPER RESPIRATORY PASSAGES. SKIN PERMEATION CAN OCCUR IN AMOUNTS CAPABLE OF PRODUCING THE EFFECTS OF SYSTEMIC TOXICITY. THERE ARE NO REPORTS OF HUMAN SENSITIZATION. EPIDEMIOLOGIC STUDIES DO NOT DEMONSTRATE A SIGNIFICANT RISK OF HUMAN CANCER FROM EXPOSURE TO THIS COMPOUND. INDIVIDUALS WITH PREEXISTING DISEASES OF THE LIVER MAY HAVE INCREASED SUSCEPTIBILITY TO THE TOXICITY OF EXCESSIVE EXPOSURES. A STUDY OF PAPAYA WORKERS SHOWS A POTENTIAL EFFECT ON REPRODUCTION AT ETHYLENE DIBROMIDE LEVELS BELOW THOSE AT WHICH OTHER TOXIC EFFECTS ARE SEEN. HOWEVER, OTHER STUDIES ON THE FERTILITY OF WORKERS EXPOSED TO EDB DEMONSTRATED NORMAL SPERM COUNTS AND NO EVIDENCE OF REDUCED BIRTHS.

KEROSENE:
TOXIC EFFECTS DESCRIBED IN ANIMALS FROM SHORT EXPOSURES BY INHALATION, INGESTION, OR SKIN CONTACT INCLUDE LUNG AND KIDNEY EFFECTS, AND NARCOSIS. NO ANIMAL TEST REPORTS ARE AVAILABLE TO DEFINE CARCINOGENIC, EMBRYOTOXIC, OR REPRODUCTIVE HAZARDS. TESTS IN BACTERIAL OR MAMMALIAN CELL CULTURES

DEMONSTRATE NO MUTAGENIC ACTIVITY. HUMAN HEALTH EFFECTS OF OVEREXPOSURE BY INHALATION, INGESTION, OR SKIN OR EYE CONTACT MAY INITIALLY INCLUDE: NONSPECIFIC DISCOMFORT, SUCH AS NAUSEA, HEADACHE, OR WEAKNESS; ABNORMAL KIDNEY FUNCTION AS DETECTED BY LABORATORY TESTS; OR TEMPORARY LUNG IRRITATION EFFECTS WITH COUGH, DISCOMFORT, DIFFICULTY BREATHING, OR SHORTNESS OF BREATH.

HIGHER EXPOSURES MAY LEAD TO THESE EFFECTS:
TEMPORARY NERVOUS SYSTEM DEPRESSION WITH ANESTHETIC EFFECTS SUCH AS DIZZINESS, HEADACHE, CONFUSION, INCOORDINATION, AND LOSS OF CONSCIOUSNESS; POSSIBLY MODEST INITIAL SYMPTOMS, FOLLOWED IN HOURS BY SEVERE SHORTNESS OF BREATH, REQUIRING PROMPT MEDICAL ATTENTION OR FATALITY FROM GROSS OVEREXPOSURE. SKIN PERMEATION CAN OCCUR IN AMOUNTS CAPABLE OF PRODUCING THE EFFECTS OF SYSTEMIC TOXICITY. THERE ARE NO REPORTS OF HUMAN SENSITIZATION. INDIVIDUALS WITH PREEXISTING DISEASES OF THE LIVER OR KIDNEYS MAY HAVE INCREASED SUSCEPTIBILITY TO THE TOXICITY OF EXCESSIVE EXPOSURES.

------12. ECOLOGICAL INFORMATION ------

SEE SECTION 2 OF THIS MSDS FOR ECOLOGICAL INFORMATION.

------13. DISPOSAL CONSIDERATIONS ------

WASTE MUST BE DISPOSED OF IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL ENVIRONMENTAL CONTROL REGULATIONS.

------14. TRANSPORTATION INFORMATION ------

DOT DESCRIPTION/PROPER SHIPPING NAME:
MOTOR FUEL ANTI-KNOCK MIXTURE (TETRAETHYL LEAD)

DOT HAZARD CLASS: 6.1, (3)

DOT ID NUMBER: UN1649, I (SEE NOTES 1 & 6)

NOTE 1: SEE CERCLA FOR REPORTABLE QUANTITY.
NOTE 6: THIS MATERIAL IS A MARINE POLLUTANT.

THIS DOT DESCRIPTION IS PROVIDED TO ASSIST IN THE PROPER CLASSIFICATION OF THIS PRODUCT AND MAY NOT BE SUITABLE FOR ALL SHIPPING CONDITIONS.

------15. REGULATORY INFORMATION ------

UNITED STATES (TSCA): ALL COMPONENTS ARE LISTED OR EXEMPTED.

AUSTRALIA (AICS): ALL COMPONENTS ARE LISTED OR EXEMPTED.

CANADA (DSL): ALL COMPONENTS ARE LISTED OR EXEMPTED.

EUROPE (EINECS): ALL COMPONENTS ARE LISTED OR EXEMPTED.

JAPAN (MITI):
THIS PRODUCT CONTAINS ONE OR MORE SUBSTANCES NOT LISTED OR EXEMPTED.

KOREA (KECL):
ALL COMPONENTS ARE LISTED OR EXEMPTED. THIS PRODUCT HAS NOT BEEN REGISTERED

FOR IMPORT.

PHILIPPINES (PICCS): ALL COMPONENTS ARE LISTED OR EXEMPTED.

HAZARD CATEGORIES FOR SARA 311/312 REPORTING ARE INDICATED BELOW:

HEALTH	IMMEDIATE (ACUTE)	YES
HEALTH	DELAYED (CHRONIC)	YES
PHYSICAL	FIRE	YES
PHYSICAL	SUDDEN RELEASE OF PRESSURE	NO
PHYSICAL	REACTIVE	YES
	NUISANCE MIST/DUST ONLY	NO

FOLLOWING ARE WHMIS CLASSIFICATIONS FOR THIS PRODUCT:
CLASS D, DIVISION 1A
CLASS D, DIVISION 1B
CLASS D, DIVISION 2A
CLASS D, DIVISION 2B

REGULATED COMPONENT NAME	CAS NO.	PERCENTAGE WT./WT.	REGULATION
1,2 DIBROMOETHANE CERCLA - RQ=1	106-93-4	35.7	SARA 313-CA NJ RTK-SHH PROP 65-CA1 WHMIS-CN2 WHMIS-HC.1 CERCLA PROP 65-CA2 PA.RTK-SHH PA.RTK-E
TETRAETHYL LEAD (TEL) SARA 302 - RQ=10, LTPQ=100, HTPQ=100 CERCLA - RQ=10	78-00-2	61.5	SARA 302 NJ RTK-SHH WHMIS-CN1 WHMIS-HC.1 CERCLA PA.RTK-E
KEROSENE	8008-20-6	2.8	NJ RTK PA.RTK WHMIS-HC1

REPORTABLE QUANTITIES (RQS) ARE CORRECT AS OF THIS MSDS ISSUE DATE. HOWEVER, BECAUSE RQS ARE REVISED PERIODICALLY, VERIFICATION OF THE RQS IS RECOMMENDED WHEN DETERMINING WHETHER A REPORTABLE RELEASE HAS OCCURRED.

------16. OTHER INFORMATION ------

PREPARATION INFORMATION:

MSDS PREPARED BY:
HEALTH, SAFETY, AND ENVIRONMENT DEPARTMENT
ETHYL CORPORATION
1-800-325-7079

MSDS PREPARATION DATE: 03/14/00

SUPERSEDES: 06/03/99

THIS INFORMATION AND THESE RECOMMENDATIONS ARE OFFERED IN GOOD FAITH AND BELIEVED TO BE CORRECT AS OF THE DATE HEREOF. INFORMATION AND RECOMMENDATIONS ARE SUPPLIED UPON THE CONDITION THAT THE RECIPIENTS WILL MAKE THEIR OWN DECISION AS TO SAFETY AND SUITABILITY FOR THEIR PURPOSES. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OF ANY OTHER NATURE, ARE MADE WITH RESPECT TO THE PRODUCT OR THE INFORMATION AND RECOMMENDATIONS. ETHYL MAKES NO REPRESENTATION AS TO COMPLETENESS OR ACCURACY. IN NO EVENT WILL ETHYL BE RESPONSIBLE FOR DAMAGES OF ANY NATURE WHATSOEVER RESULTING FROM THE USE OR RELIANCE UPON THE INFORMATION AND RECOMMENDATIONS.

FOR PRODUCT INFORMATION CONTACT ETHYL SALES REPRESENTATIVE
ETHYL PETROLEUM ADDITIVES, INC.
(A SUBSIDIARY OF ETHYL CORPORATION)
330 SOUTH FOURTH STREET
RICHMOND, VA 23218-2189
1-800-325-7079

THIS MATERIAL SAFETY DATA SHEET CONTAINS AT LEAST THE INFORMATION REQUIRED BY THE FEDERAL OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 (G) (2).

06/03/99

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

AVIATION GASOLINE

Product Use: Fuel
Product Number(s): CPS200205, CPS200239, CPS200285, CPS200456
Synonyms: Avgas 100, Avgas 100 LL
Company Identification
Chevron Global Aviation
a division of Chevron U.S.A., Inc.
1500 Louisiana St.
Houston, TX 77002
United States of America

Transportation Emergency Response
CHEMTREC: +1 800-424-9300 or +1 703-527-3887
Health Emergency
Chevron Emergency Information Center: Emergency Information Centers are located in the USA.
International collect calls accepted. +1 800-231-0623 or +1 510-231-0623
Product Information
Product Information: +1 510-242-5357 (USA)
MSDS Requests: +1 800-689-3998 (USA)

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Aviation Gasoline		100 %volume
Naphtha, light alkylate	64741-66-8	70 - 100 %volume
Naphtha, isomerization	64741-70-4	0 - 10 %volume
Toluene	108-88-3	0 - 20 %volume
Benzene	71-43-2	0 - 1 %volume
Tetraethyl lead	78-00-2	< 4 ml/gal
Ethylene dibromide	106-93-4	< 4 ml/gal

SECTION 3 HAZARDS IDENTIFICATION

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EMERGENCY OVERVIEW

- EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE
- HARMFUL OR FATAL IF SWALLOWED - MAY CAUSE LUNG DAMAGE IF SWALLOWED
- CAUSES EYE AND SKIN IRRITATION
- MAY CAUSE RESPIRATORY TRACT IRRITATION IF INHALED
- VAPOR HARMFUL
- SUSPECT CANCER HAZARD - MAY CAUSE CANCER

2a

- BIRTH DEFECT HAZARD - CONTAINS MATERIAL THAT MAY CAUSE BIRTH DEFECTS
- MAY CAUSE DAMAGE TO:
- NERVOUS SYSTEM
- AUDITORY SYSTEM

****

IMMEDIATE HEALTH EFFECTS

Eye: Contact with the eyes causes irritation. Symptoms may include pain, tearing, reddening, swelling and impaired vision.

Skin: Contact with the skin causes irritation. Symptoms may include pain, itching, discoloration, swelling, and blistering. Contact with the skin is not expected to cause an allergic skin response. Not expected to be harmful to internal organs if absorbed through the skin.

Ingestion: Because of its low viscosity, this material can directly enter the lungs, if swallowed, or if subsequently vomited. Once in the lungs it is very difficult to remove and can cause severe injury or death. May be irritating to mouth, throat, and stomach. Symptoms may include pain, nausea, vomiting, and diarrhea.

Inhalation: The vapor or fumes from this material may cause respiratory irritation. Symptoms of respiratory irritation may include coughing and difficulty breathing.

DELAYED OR OTHER HEALTH EFFECTS:

Reproduction and Birth Defects: Contains material that may cause adverse reproductive effects if inhaled.

Cancer: Prolonged or repeated exposure to this material may cause cancer. Contains benzene, which has been classified as a carcinogen by the National Toxicology Program (NTP) and a Group 1 carcinogen (carcinogenic to humans) by the International Agency for Research on Cancer (IARC).
Contains ethylene dibromide which has been classified as a Group 2A carcinogen by the International Agency for Research on Cancer (IARC). Whole gasoline exhaust has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC).

Target Organs: Repeated inhalation of this material at concentrations above the recommended exposure limit may cause damage to the following organ(s) based on animal data: Nervous System Auditory System
See Section 11 for additional information. Risk depends on duration and level of exposure.

SECTION 4 FIRST AID MEASURES

Eye: Flush eyes with water immediately while holding the eyelids open. Remove contact lenses, if worn, after initial flushing, and continue flushing for at least 15 minutes. Get medical attention if irritation persists.

Skin: Wash skin with water immediately and remove contaminated clothing and shoes. Get medical attention if any symptoms develop. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.

Ingestion: If swallowed, get immediate medical attention. Do not induce vomiting. Never give anything by mouth to an unconscious person.

Inhalation: Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue.

Note to Physicians: Ingestion of this product or subsequent vomiting may result in aspiration of light hydrocarbon liquid, which may cause pneumonitis.

SECTION 5 FIRE FIGHTING MEASURES

See Section 7 for proper handling and storage.

FIRE CLASSIFICATION:
OSHA Classification (29 CFR 1910.1200): Flammable liquid.

NFPA RATINGS: Health: 1 Flammability: 3 Reactivity: 0

FLAMMABLE PROPERTIES:
Flashpoint: (Tagliabue Closed Cup ASTM D56) -46 °C (-51 °F) (Min)
Autoignition: 440 °C (824 °F)
Flammability (Explosive) Limits (% by volume in air): Lower: 1.2 Upper: 7

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

PROTECTION OF FIRE FIGHTERS:
Fire Fighting Instructions: For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in the vicinity of the spill or released vapor. If this material is released into the work area, evacuate the area immediately. Monitor area with combustible gas indicator.
Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. All equipment used when handling the product must be grounded. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.
Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: This product presents an extreme fire hazard. Liquid very quickly evaporates, even at low temperatures, and forms vapor (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Do not breathe vapor or fumes. Wash thoroughly after handling.
General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API)

Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.
General Storage Information: DO NOT USE OR STORE near heat, sparks, flames, or hot surfaces . USE AND STORE ONLY IN WELL VENTILATED AREA. Keep container closed when not in use.
Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:
Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below the recommended exposure limits.

PERSONAL PROTECTIVE EQUIPMENT
Eye/Face Protection: Wear protective equipment to prevent eye contact. Selection of protective equipment may include safety glasses, chemical goggles, face shields, or a combination depending on the work operations conducted.
Skin Protection: Wear protective clothing to prevent skin contact. Selection of protective clothing may include gloves, apron, boots, and complete facial protection depending on operations conducted. Suggested materials for protective gloves include: Nitrile Rubber, Polyurethane, Chlorinated Polyethylene (or Chlorosulfonated Polyethylene), Viton.
Respiratory Protection: Determine if airborne concentrations are below the recommended occupational exposure limits for jurisdiction of use. If airborne concentrations are above the acceptable limits, wear an approved respirator that provides adequate protection from this material, such as: Air-Purifying Respirator for Organic Vapors.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.
Occupational Exposure Limits:

Component	Agency	TWA	STEL	Ceiling	Notation
Aviation Gasoline	CVX	200 ppm	1000 ppm	--	--
Benzene	ACGIH	.5 ppm (weight)	2.5 ppm (weight)	--	Skin A1 Skin
Benzene	CVX	1 ppm (weight)	5 ppm (weight)	--	--
Benzene	OSHA SRS	1 ppm (weight)	5 ppm (weight)	--	--
Benzene	OSHA Z-2	10 ppm (weight)	--	25 ppm (weight)	--
Ethylene dibromide	OSHA Z-2	20 ppm (weight)	--	30 ppm (weight)	--
Tetraethyl lead	ACGIH	.1 mg/m3	--	--	Skin as Pb

Tetraethyl lead	OSHA SRS	.05 mg/m3	--	--	--
Tetraethyl lead	OSHA Z-1	.075 mg/m3	--	--	Skin as Pb
Toluene	ACGIH	50 ppm (weight)	--	--	Skin A4
Toluene	OSHA Z-2	200 ppm (weight)	--	300 ppm (weight)	--

Refer to the OSHA Benzene Standard (29 CFR 1910.1028) and Table Z-2 for detailed training, exposure monitoring, respiratory protection and medical surveillance requirements before using this product.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Blue or green dyed
Physical State: Liquid
Odor: Petroleum odor
pH: Not Applicable
Vapor Pressure: 38 - 49 kPa @ 38 °C (100.4 °F)
Vapor Density (Air = 1): 3 - 4 (Estimated)
Boiling Point: 60°C (140°F) - 170°C (338°F)
Solubility: Low PPM range in water.
Freezing Point: -58°C (-72.4°F) (Max)
Specific Gravity: 0.65 - 0.75 @ 15°C (59°F)
Viscosity: <1 SUS @ 37.8°C (100°F)

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
Hazardous Decomposition Products: None known (None expected)
Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS
Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product components.
Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components.
Skin Sensitization: The skin sensitization hazard is based on evaluation of data for similar materials or product components.
Acute Dermal Toxicity: The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.
Acute Oral Toxicity: The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.
Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

ADDITIONAL TOXICOLOGY INFORMATION:
This product contains light alkylate naphtha. An inhalation study in rats found no adverse effects on male or female reproductive abilities and no birth defects in pups born to the exposed mothers. This study was done with that portion of light alkylate naphtha that distilled below 145 F (C4 to C6

hydrocarbons). The concentrations used in the study were up to 25,000 mg/m3 which is 60% of the lower explosive limit. That dose was also the no-observed-adverse-effect level.

This product contains benzene.
GENETIC TOXICITY/CANCER: Repeated or prolonged breathing of benzene vapor has been associated with the development of chromosomal damage in experimental animals and various blood diseases in humans ranging from aplastic anemia to leukemia (a form of cancer). All of these diseases can be fatal. In some individuals, benzene exposure can sensitize cardiac tissue to epinephrine which may precipitate fatal ventricular fibrillation.
REPRODUCTIVE/DEVELOPMENTAL TOXICITY: No birth defects have been shown to occur in pregnant laboratory animals exposed to doses not toxic to the mother. However, some evidence of fetal toxicity such as delayed physical development has been seen at such levels. The available information on the effects of benzene on human pregnancies is inadequate but it has been established that benzene can cross the human placenta.
OCCUPATIONAL: The OSHA Benzene Standard (29 CFR 1910.1028) contains detailed requirements for training, exposure monitoring, respiratory protection and medical surveillance triggered by the exposure level. Refer to the OSHA Standard before using this product.

This product contains toluene.
GENERAL TOXICITY: The primary effects of exposure to toluene in animals and humans are on the central nervous system. Solvent abusers, who typically inhale high concentrations (thousands of ppm) for brief periods of time, in addition to experiencing respiratory tract irritation, often suffer permanent central nervous system effects that include tremors, staggered gait, impaired speech, hearing and vision loss, and changes in brain tissue. Death in some solvent abusers has been attributed to cardiac arrhythmias, which appear to be have been triggered by epinephrine acting on solvent sensitized cardiac tissue. Although liver and kidney effects have been seen in some solvent abusers, results of animal testing with toluene do not support these as primary target organs.
HEARING: Humans who were occupationally exposed to concentrations of toluene as low as 100 ppm for long periods of time have experienced hearing deficits. Hearing loss, as demonstrated using behavioral and electrophysiological testing as well as by observation of structural damage to cochlear hair cells, occurred in experimental animals exposed to toluene. It also appears that toluene exposure and noise may interact to produce hearing deficits.
COLOR VISION: In a single study of workers exposed to toluene at levels under 50 ppm, small decreases in the ability to discriminate colors in the blue-yellow range have been reported for female workers. This effect, which should be investigated further, is very subtle and would not likely have been noticed by the people tested.
REPRODUCTIVE/DEVELOPMENTAL TOXICITY: Toluene may also cause mental and/or growth retardation in the children of female solvent abusers who directly inhale toluene (usually at thousands of ppm) when they are pregnant. Toluene caused growth retardation in rats and rabbits when administered at doses that were toxic to the mothers. In rats, concentrations of up to 5000 ppm did not cause birth defects. No effects were observed in the offspring at doses that did not intoxicate the pregnant animals. The exposure level at which no effects were seen (No Observed Effect Level, NOEL) is 750 ppm in the rat and 500 ppm in the rabbit.

This material contains organic lead. Organic lead (as Pb) is toxic by ingestion, inhalation, and skin contact. Signs and symptoms of chronic or subacute poisoning may initially include insomnia and restlessness; progressing into nausea, vomiting, loss of appetite, dizziness, abnormal blood pressure and temperature, increased respiratory rate, and skin pallor. In addition, continued exposure or acute poisoning may result in weakness, loss of weight, visual and auditory hallucinations, violent or maniacal type attacks, increased excitability, coarse tremors, convulsions and death.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY

The ecotoxicity hazard is based on data for a similar material.

ENVIRONMENTAL FATE

This material is expected to be readily biodegradable. Following spillage, the more volatile components of gasoline will be rapidly lost, with concurrent dissolution of these and other constituents into the water. Factors such as local environmental conditions (temperature, wind, mixing or wave action, soil type, etc), photo-oxidation, biodegradation and adsorption onto suspended sediments, can contribute to the weathering of spilled gasoline.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: GASOLINE, 3, UN1203, II, MARINE POLLUTANT (LEADED GASOLINE), RQ (LEAD)

IMO/IMDG Shipping Description: UN1203, GASOLINE, 3, II, MARINE POLLUTANT(GASOLINE LEADED), FLASH POINT SEE SECTION 5

ICAO/IATA Shipping Description: UN1203, GASOLINE, 3, II

SECTION 15 REGULATORY INFORMATION

EPCRA 311/312 CATEGORIES:

1.	Immediate (Acute) Health Effects:	YES
2.	Delayed (Chronic) Health Effects:	YES
3.	Fire Hazard:	YES
4.	Sudden Release of Pressure Hazard:	NO
5.	Reactivity Hazard:	NO

REGULATORY LISTS SEARCHED:

01-1=IARC Group 1	03=EPCRA 313
01-2A=IARC Group 2A	04=CA Proposition 65
01-2B=IARC Group 2B	05=MA RTK
02=NTP Carcinogen	06=NJ RTK
	07=PA RTK

The following components of this material are found on the regulatory lists indicated.

Benzene	01-1, 02, 03, 04, 05, 06, 07
Ethylene dibromide	01-2A, 02, 03, 04, 05, 06, 07

Tetraethyl lead	03, 04, 05, 06, 07
Toluene	03, 04, 05, 06, 07

CERCLA REPORTABLE QUANTITIES(RQ)/EPCRA 302 THRESHOLD PLANNING QUANTITIES(TPQ):

Component	Component RQ	Component TPQ	Product RQ
Benzene	10 lbs	None	733 lbs
Ethylene dibromide	1 lbs	None	616 lbs
Tetraethyl lead	10 lbs	None	6155 lbs
Toluene	1000 lbs	None	3736 lbs

CHEMICAL INVENTORIES:
All components comply with the following chemical inventory requirements: AICS (Australia), EINECS (European Union), IECSC (China), KECI (Korea), TSCA (United States).

WHMIS CLASSIFICATION:
Class B, Division 2: Flammable Liquids
Class D, Division 2, Subdivision A: Very Toxic Material -
Chronic Toxic Effects
Teratogenicity and Embryotoxicity
Carcinogenicity
Class D, Division 2, Subdivision B: Toxic Material -
Skin or Eye Irritation

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 1 Flammability: 3 Reactivity: 0

(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet: 1.
Revision Date: February 26, 2008

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Government Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Chevron Energy Technology Company, 100 Chevron Way,

Richmond, California 94802.

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

ConocoPhillips

MATERIAL SAFETY DATA SHEET

Phillips Kerosene

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name:	Phillips Kerosene
Product Code:	1014057, 1015770
Intended Use:	Fuel
Synonyms:	Phillips Dyed Kerosene Phillips K1 Kerosene Phillips K2 Kerosene Phillips Kerosine Phillips No. 1 Fuel Oil Phillips Ultra Low Sulfur Diesel/Kerosene Stove Oil Straight Run Kerosene
Chemical Family:	Petroleum Hydrocarbon
Responsible Party:	Phillips 66 A Division of ConocoPhillips 600 N. Dairy Ashford Houston, Texas 77079-1175
Customer Service:	800-762-0942
Technical Information:	918-661-8327

The intended use of this product is indicated above. If any additional use is known, please contact us at the Technical Information number listed.

EMERGENCY OVERVIEW

24 Hour Emergency Telephone Numbers:
Spill, Leak, Fire or Accident Call CHEMTREC:
North America: (800) 424-9300
Others: (703) 527-3887 (collect)

California Poison Control System: (800) 356-3219

Health Hazards/Precautionary Measures: Causes skin irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Do not taste or swallow. Wash thoroughly after handling.

Physical Hazards/Precautionary Measures: Keep away from heat, sparks, flames, static electricity or other sources of ignition. Flammable liquid and vapor.

Appearance:	Clear, light yellow, or light green , (may be dyed red)
Physical Form:	Liquid
Odor:	Kerosene

NFPA 704 Hazard Class:		**HMIS Hazard Class:**	
Health:	2 (Moderate)	**Health:**	2* (Moderate)
Flammability:	2 (Moderate)	**Flammability:**	2 (Moderate)

2a

Instability:	0 (Least)	**Physical Hazards:**	0 (Least)

* Indicates possible chronic health effects.

2. COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS					
Component / CAS No:	**Percent (%)**	**ACGIH:**	**OSHA:**	**NIOSH:**	**Other:**
Hydrodesulfurized Kerosene ..C9-16 64742-81-0	0-100	200 mg/m³ TWA-SKIN	NE	NE	NE
Hydrotreated Distillate, Light ..C9-16 64742-47-8	0-100	200 mg/m³ TWA-SKIN	NE	NE	NE
Kerosene ..C9-16 8008-20-6	0-100	200 mg/m³ TWA-SKIN	NE	NE	NE
Naphthalene 91-20-3	0-3	10 ppm TWA 52 mg/m³ TWA 15 ppm STEL 79 mg/m³ STEL	10 ppm TWA 50 mg/m³ TWA	250 ppm IDLH	NE

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

1%=10,000 PPM.
NE=Not Established

All components are listed on the TSCA inventory.

3. HAZARDS IDENTIFICATION

Potential Health Effects:

Eye: Contact may cause mild eye irritation including stinging, watering, and redness.

Skin: Mild to moderate skin irritant. Contact may cause redness, itching, burning, and skin damage. Prolonged or repeated contact may cause drying and cracking of the skin, dermatitis (inflammation), burns, and severe skin damage. Not acutely toxic by skin absorption, but prolonged or repeated skin contact may be harmful (see Section 11).

Inhalation (Breathing): Expected to have a low degree of toxicity by inhalation.

Ingestion (Swallowing): Low degree of toxicity by ingestion. ASPIRATION HAZARD - This material can enter lungs during swallowing or vomiting and cause lung inflammation and damage.

Signs and Symptoms: Effects of overexposure may include irritation of the nose and throat, irritation of the digestive tract, nausea, vomiting, pneumonitis (inflammation of the lungs), transient excitation followed by signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue).

Cancer: Inadequate evidence of carcinogenicity (see Sections 11 and 15). However, a component is a possible cancer hazard (see Sections 11).

Target Organs: Inadequate data available for this material.

Developmental: Inadequate evidence available for this material. See Section 11 for developmental toxicity information of individual components, if any.

Other Comments: Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage (sometimes referred to as Solvent or Painters' Syndrome). Intentional misuse by deliberately concentrating and inhaling this material may be harmful or fatal.

Pre-Existing Medical Conditions: Conditions aggravated by exposure may include skin disorders, respiratory (asthma-like) disorders.

4. FIRST AID MEASURES

Eye: If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water. If symptoms persist, seek medical attention.

Skin: Remove contaminated shoes and clothing, and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water. If irritation or redness develops, seek medical attention.

Inhalation (Breathing): If respiratory symptoms develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.

Notes to Physician: High-pressure hydrocarbon injection injuries may produce substantial necrosis of underlying tissue despite an innocuous appearing external wound. Often these injuries require extensive emergency surgical debridement and all injuries should be evaluated by a specialist in order to assess the extent of injury.

5. FIRE-FIGHTING MEASURES

Flammable Properties:

Flash Point:	100-150°F/38-66°C (TCC, ASTM D-56)
OSHA Flammability Class:	Combustible liquid
NFPA Flammability Class:	No data
LEL%:	0.7
UEL%:	7.0
Autoignition Temperature:	410°F/210°C

Unusual Fire & Explosion Hazards: This material is flammable and can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, or mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

Extinguishing Media: Dry chemical, carbon dioxide, water spray, or foam. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.

Fire Fighting Instructions: For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk.

Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

6. ACCIDENTAL RELEASE MEASURES

Flammable. Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof electrical equipment is recommended.

Stay upwind and away from spill/release. Notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8).

Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Dike far ahead of spill for later recovery or disposal. Use foam on spills to minimize vapors (see Section 5). Spilled material may be absorbed into an appropriate absorbent material.

Notify fire authorities and appropriate federal, state, and local agencies. Immediate cleanup of any spill is recommended. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, notify the National Response Center (phone number 800-424-8802).

7. HANDLING AND STORAGE

Handling: Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel to another. Can accumulate static charge by flow or agitation. Can be ignited by static discharge. The use of explosion-proof electrical equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-704 and/or API RP 2003 for specific bonding/grounding requirements.

Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Sections 2 and 8).

Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames. Use good personal hygiene practices.

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing of high pressure hydraulic oil equipment.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Storage: Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Post area "No Smoking or Open Flame." Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits (see Section 2), additional engineering controls may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

Personal Protective Equipment (PPE):

Respiratory: A NIOSH certified air purifying respirator with an organic vapor cartridge may be used under conditions where airborne concentrations are expected to exceed exposure limits (see Section 2).

Protection provided by air purifying respirators is limited (see manufacturer's respirator selection guide). Use a NIOSH approved self-contained breathing apparatus (SCBA) or equivalent operated in a pressure demand or other positive pressure mode if there is potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection.

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

Skin: The use of gloves impervious to the specific material handled is advised to prevent skin contact, possible irritation, absorption, and skin damage. Examples of approved materials are nitrile, or Viton® (see glove manufacturer literature for information on permeability). Depending on conditions of use, apron and/or arm covers may be necessary.

Eye/Face: Approved eye protection to safeguard against potential eye contact, irritation, or injury is recommended. Depending on conditions of use, a face shield may be necessary.

Other Protective Equipment: A source of clean water should be available in the work area for flushing eyes and skin. Impervious clothing should be worn as needed.

Suggestions for the use of specific protective materials are based on readily available published data. Users should check with specific manufacturers to confirm the performance of their products.

9. PHYSICAL AND CHEMICAL PROPERTIES

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm).

Appearance:	Clear, light yellow, or light green (may be dyed red)
Physical Form:	Liquid
Odor:	Kerosene
Odor Threshold:	No data
pH:	Not applicable
Vapor Pressure (mm Hg):	0.40
Vapor Density (air=1):	4.5 >
Boiling Point:	300-572°F / 149-300°C
Melting/Freezing Point:	< -40°F / -40°C
Solubility in Water:	<0.1%
Partition Coefficient (n-octanol/water):	No data
Specific Gravity:	0.775-0.840
Bulk Density:	6.73
Bulk Density Units	lbs/gal
Viscosity cSt @ 40°C:	1.0-2.4
VOC Content(%):	6.73 lb/gal
Percent Volatile:	98-100
Percent Volitale Special Conditions	@ 545°F (285°C)
Evaporation Rate (nBuAc=1):	<1
Flash Point:	100-150°F/38-66°C
Test Method:	(TCC, ASTM D-56)
LEL%:	0.7
UEL%:	7.0
Autoignition Temperature:	410°F/210°C

10. STABILITY AND REACTIVITY

Stability: Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure. Flammable liquid and vapor. Vapor can cause flash fire.

Conditions to Avoid: Avoid all possible sources of ignition (see Sections 5 and 7).

Materials to Avoid (Incompatible Materials): Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite, calcium hypochlorite, etc.

Hazardous Decomposition Products: The use of hydrocarbon fuels in an area without adequate ventilation may result in hazardous levels of combustion products (e.g., oxides of carbon, sulfur and nitrogen, and other hydrocarbons) and/or dangerously low oxygen levels. Combustion can yield carbon, nitrogen and sulfur oxides.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Chronic Data:

Hydrodesulfurized Kerosene ..C9-16 - CAS: 64742-81-0
Carcinogenicity: Application of hydrodesulfurized kerosene to mouse skin, twice a week for 12 months, resulted in an increased incidence of skin tumors. It has not been identified as a carcinogen by NTP, IARC or OSHA.

Developmental: Hydrodesulfurized kerosene applied to the skin of female rats at 494, 330, or 165 mg/kg daily for 7 consecutive weeks (premating, mating, and gestation), or for 8 consecutive weeks in males did not result in systemic, reproductive, or developmental toxicity.

Hydrotreated Distillate, Light ..C9-16 - CAS: 64742-47-8
Carcinogenicity: Prolonged and repeated skin exposure of mice to certain middle distillate streams has resulted in dermatitis, which has been associated with the promotion of skin tumors via a non-genotoxic mechanism. This material has not been identified as a carcinogen by NTP, IARC, or OSHA.

Kerosene ..C9-16 - CAS: 8008-20-6
Carcinogenicity: Petroleum middle distillates, a class of hydrocarbons distilled from crude oil at approximately 350-750 degrees F, have been shown to cause skin tumors in mice following repeated and prolonged skin contact. The response is typically weak with a low tumor yield and long latency period. Additional studies have shown that these tumors are produced through a non-genotoxic mechanism associated with frequent cell damage and repair, and that they are not likely to cause tumors in the absence of prolonged skin irritation. Animal studies have also shown that washing the skin with soap and water can reduce the tumor response. Middle distillates with low polynuclear aromatic hydrocarbon content have not been identified as a carcinogen by NTP, IARC or OSHA.

Naphthalene - CAS: 91-20-3
Carcinogenicity: Naphthalene has been evaluated in two year inhalation studies in both rats and mice. The National Toxicology Program (NTP) concluded that there is clear evidence of carcinogenicity in male and female rats based on increased incidences of respiratory epithelial adenomas and olfactory epithelial neuroblastomas of the nose. NTP found some evidence of carcinogenicity in female mice (alveolar adenomas) and no evidence of carcinogenicity in male mice. Naphthalene has been identified as a carcinogen by IARC.

Acute Data:

Hydrodesulfurized Kerosene ..C9-16 - CAS: 64742-81-0
Dermal LD50 = >=2 g/kg (Rabbit) (As Kerosene)
LC50 = >5 mg/L (4-hr., Rat) (As Kerosene)
Oral LD50 = >5 g/kg (Rat) (As Kerosene)

Hydrotreated Distillate, Light ..C9-16 - CAS: 64742-47-8
Dermal LD50 = >2g/kg (Rabbit) (As Kerosene)
LC50 = >5mg/L (4-hr., Rat) (As Kerosene)
Oral LD50 = > 5g/kg (Rat) (As Kerosene)

Kerosene ..C9-16 - CAS: 8008-20-6
Dermal LD50 = >2,000 mg/kg (Rabbit)
LC50 = >5000 ppm (rat)
Oral LD50 = >5 g/kg (Rat), = 28 ml/kg (Rabbit), =20 ml/kg (Guinea Pig)

Naphthalene - CAS: 91-20-3
Dermal LD50 = >20 g/kg (rabbit); >2 g/kg (rabbit); >2.5 g/kg (rat)
LC50 = >340 mg/m^3/1H (rat)
Oral LD50 = 490 mg/ks (rat); 2.6 g/kg (rat), 2.6 g/kg (rat); 1.2 g/kg (g. pig)

12. ECOLOGICAL INFORMATION

When kerosenes and jet fuels escape into the environment due to leaks or spills, most of their constituent hydrocarbons will evaporate and be photodegraded by reaction with hydroxyl radicals in the atmosphere. The half-lives in air for many of the individual hydrocarbons is less then one day. Less volatile hydrocarbons can persist in the aqueous environment for longer periods. They remain floating on the surface of the water; those that reach soil or sediment biodegrade relatively slowly. Soil contaminated with jet fuel can develop adapted microbial species able to use the fuel as a carbon source; soil aeration and nutrient supplementation can enhance this biodegradation.

Reported LC50/EC50 values for water-soluble fractions of kerosenes and jet fuels are usually in the range of 10 to 100 mg/liter. Adverse effects on the gills, pseudobranch, kidney and nasal mucosa have been reported in fish involved in spills of jet fuel. Juvenile clams may be particularly sensitive to marine sediments contaminated as a result of spilled jet fuel. Direct toxicity and fouling of sea birds from jet fuel can occur if birds dive through floating layers of spilled fuel.

Phytotoxic effects of jet fuel have been reported following exposure of plants to sprays or vapors. Lack of seed germination and inhibition of seedling growth may also occur. There is evidence for moderate bioaccumulation of the water-soluble hydrocarbons present in jet fuels.

13. DISPOSAL CONSIDERATIONS

This material, if discarded as produced, would be a RCRA "characteristic" hazardous waste due to the characteristic(s) of ignitability (D001), and benzene (D018). If the spilled or released material impacts soil, water, or other media, characteristic testing of the contaminated materials may be required prior to their disposal. Further, this material, once it becomes a waste, is subject to the land disposal restrictions in 40 CFR 268.40 and may require treatment prior to disposal to meet specific standards. Consult state and local regulations to determine whether they are more stringent than the federal requirements.

Container contents should be completely used and containers should be emptied prior to discard. Container rinsate could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a drum reconditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

14. TRANSPORTATION INFORMATION

DOT Proper Shipping Description: Kerosene, 3, UN1223, PG III, RQ (Naphthalene/100 lbs., Biphenyl/100 lbs.) or Kerosene, Combustible liquid, NA1223, PG III, RQ (Naphthalene/100 lbs., Biphenyl/100 lbs.)

Bulk Package/Placard Marking: Flammable or Combustible/1223 Class 3 red-colored "Flammable" or "Combustible" placard with a 1223 panel added.

Non-Bulk Package Labels: Class 3 red-colored "Flammable Liquid" label.

Packaging - References (Exceptions, Non-Bulk, Bulk): 49 CFR 172.102(b)(144), (B1), (IB3), (T2), & (TP2)
49 CFR 173.150, 173.202, 173.242

Emergency Response Guide: 128

Note: This product is classified and regulated as a DOT "Flammable Liquid" if its flash point temperature is below 140°F. (60°C.); however, it may be reclassified as a "Combustible Liquid" when shipped domestically by highway or rail and it is not regulated if shipped in non-bulk packages of less than 1,001 lbs. (454 kg).

IMDG Shipping Description: Kerosene, 3, UN1223, PG III

ICAO/IATA Shipping Description: Kerosene, UN1223, Division 3, Packing Instruction 309 or 310

15. REGULATORY INFORMATION

U.S. Regulations:

EPA SARA 311/312 (Title III Hazard Categories)

Acute Health:	Yes
Chronic Health:	Yes
Fire Hazard:	Yes
Pressure Hazard:	No
Reactive Hazard:	No

SARA - Section 313 and 40 CFR 372:
This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:
Naphthalene.....91-20-3.....0-3%

EPA (CERCLA) Reportable Quantity (In pounds):
Naphthalene.....91-20-3..... 100

CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (In pounds):
This material contains the following chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372:
-- None Known --

California Proposition 65:
Warning: This material contains the following chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):
Benzene - Cancer, Developmental and Reproductive Toxicant
Naphthalene - Cancer
Toluene - Developmental Toxicant

Carcinogen Identification:
This material has not been identified as a carcinogen by NTP, IARC, or OSHA. See Section 11 for carcinogenicity information of individual components, if any.

TSCA:
All components are listed on the TSCA inventory.

International Regulations:

Canadian Regulations:
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

Domestic Substances List: Listed
WHMIS Classification: B2-Flammable Liquid
WHMIS Classification: D2B-Materials causing other toxic effects - Toxic Material

16. OTHER INFORMATION

Issue Date:	08-Dec-2004
Previous Issue Date:	01/01/2003
Product Code:	1014057, 1015770
Reason for revision:	Changes to Physical Properties. SEE SECTION 9.
MSDS Code:	682950

Disclaimer of Expressed and implied Warranties:
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